APRIL 2015

totalworld:energy

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The realisation of a dream

This month, Total World Energy revisits the innovative story of Solar Impulse 2 as it embarks on its most adventurous flight yet after ten years in the making – to circumnavigate the globe and overcome the seemingly impossible challenge to fly for five consecutive days and nights across the Atlantic Ocean.

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Diversifying Chile's energy mix

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Celebrating 65 years

Borkum Riffgrund 1

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So far this year at Total World Energy, we have featured numerous energy utility and generation companies located across the globe and this month, we look at Chile's nationally-owned oil company, ENAP, which saw profits rise to $157 million last year, a 15% increase on 2013.

In Sub-Saharan Africa, NamPower has now been in operation for more than 40 years - with future plans to invest NAD$30 billion for infrastructure developments, this will help to ensure security of supply for Namibia, boost its generation capacity and power supply footprint.

Looking at a different and innovative source of electricity generation, we speak with Frank Zammataro, President and Co-Founder of Rentricity, in an idea that came along completely by chance, he has developed a highly effective concept to utilise the waste water that flows continuously through the water pipes in America.

Still on track for completion later this year, the Borkum Riffgrund 1 wind power project will generate enough electricity to power over 300,000 German households and with the installation of the Suction Bucket Jacket Foundation developed by DONG Energy, it is hoped this new concept will help to revolutionise the wind power industry as it begins its inevitable journey into much harsher and deeper terrains.

Lastly, we follow up on the long awaited journey of Solar Impulse 2 on its attempt to circumnavigate the globe using only solar power – follow us on Twitter @TWEmagazine to keep up to date with its progress!

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GE announce contracts in Egypt to deliver over 2.6 GW of power

At the Egypt Economic Development Conference, GE signed major contracts with the government of Egypt to deliver 2.683 gigawatts (GW) of electricity, which is equivalent to the energy needed to power more than 2.5 million homes. GE will be supplying a total of 46 turbines: 34 aeroderivative gas turbines and 12 heavy-duty gas turbines, which will start delivering power as soon as May 2015. The announced contracts were signed in December of 2014 and construction is currently underway.

"We are building on our 40 years of supporting Egypt and proud to be bringing 2.6 GW of critical, multi-modal power in support of the Egyptian Power Boost Program," said Steve Bolze, president & CEO of GE Power & Water. "From signing to service in five months, this project demonstrates our capabilities and confidence in delivering on projects of this size and at this speed, as we did in Algeria and other parts of the region. We are making great progress in Egypt on the build out, and it will be one of the fastest project executions of this scale in our history."

In December 2014, within hours of signing contracts with the government of Egypt, GE dispatched its advanced gas turbine technology to construction sites across Egypt. Currently, GE's advanced gas turbines help generate more than 9.5 GW of electricity in Egypt, nearly 30 percent of the country's total installed capacity.

According to the Oxford Business Group, Egypt's power generating capacity must be scaled up to 50 GW by 2025, nearly double the capacity today, with demand growing at an annual 10 to 12 percent. By selecting GE to partner in the "Egyptian Power Boost Program," the government of Egypt will soon have the most flexible power equipment anywhere, operating on gas or diesel and with the ability to switch fuels while in operation. The additional power is expected to start to deliver power in May, in time to help meet the soaring demand for electricity during the summer months.

Boskalis achieves record year in profits

Royal Boskalis Westminster N.V. achieved net profit of EUR 490 million in 2014. Revenue rose by 1 per cent to EUR 3.2 billion. EBITDA rose by 25 per cent to EUR 946 million and the operating result was up 41 per cent at EUR 652 million.

Across the board, 2014 was an operationally strong year with in addition a large number of exceptional items for a total amount on balance of EUR 200 million before tax. All three segments achieved a sharply higher result compared to 2013. Dredging & Inland Infra had a busy year with good fleet utilization, good project margins and substantial settlement results on old projects. Offshore Energy also had a good year with high fleet utilization and good project margins. Moreover, Dockwise contributed an extra quarter to earnings compared to 2013 and realized exceptional cancellation and rescheduling fees. Towage & Salvage reported a higher result with good results from the settlement of old salvage projects.

The order book remained virtually stable at EUR 3,286 million.

Peter Berdowski, CEO Boskalis: “We look back on a fantastic 2014, a year in which we achieved a very strong performance across the full breadth of our activities. In this context, it is worth noting that the result Dockwise achieved in its first full year with the group was an all-time high.

“Despite being busy in the past year we made significant progress in optimizing our organization and the business processes, in accordance with our 2014-2016 Business Plan. The introduction of the previously announced divisional model has now been implemented, and the physical integration of Dockwise and Fairmount in Papendrecht is being completed.

“The great result in 2014 has enabled us to strengthen our balance sheet sooner than we expected, with the solvency ratio now exceeding 53%. And so amid turbulent conditions we came to the end of a fantastic year, with a strong balance sheet and a streamlined organization.”

MHI successfully demonstrates its wireless power transmission technology

Mitsubishi Heavy Industries, Ltd. (MHI) has conducted ground demonstration testing of "wireless power transmission," a new technology presently under development to serve as the core technology of the space solar power systems (SSPS) that are expected to be the power generation systems of the future. With successful completion of the test at the company's Kobe Shipyard & Machinery Works, MHI has now verified the viability of long-distance wireless power transmission.

In the ground demonstration test, 10 kilowatts (kW) of power was sent from a transmitting unit by microwave. The reception of power was confirmed at a receiver unit located at a distance of 500 meters (m) away by the illumination of LED lights, using part of power transmitted. The transmission distance and power load mark new milestones in Japan with respect to length and volume of wireless power transmission. The testing also confirmed the performance of the advanced control system technology used to regulate the direction of the microwave beam so that it does not veer from the targeted receiver unit.

MHI conducted the ground demonstration testing based on an agreement with Japan Space Systems, the incorporated foundation that has been consigned by the Japanese Ministry of Economy, Trade and Industry to carry out the "2012 Solar Power Wireless Transmission Technology Development Project."

Wireless power transmission technology aims to eliminate the cable connections conventionally necessary for transmitting electricity, and the newly successful test results lead the way to applying the technology in numerous terrestrial fields. The achievement of wireless power transmission over long distances will not only facilitate the transmission of power to locations where installation of power cables has been difficult or dangerous; it is also expected to contribute to transmission of power from offshore wind turbines and various other applications in the future. One readily conceivable application is wireless transmission of power to electric vehicles.

The wireless power transmission being developed for SSPS usage is referred to as a radio emission technology, and once the technology is achieved it will enable wireless transmission of power over unprecedented distances.

The SSPS is being developed as a system that will generate power on a geostationary satellite at 36,000 kilometers above the earth using solar cell panels; the generated power will be transmitted to earth by microwave/laser - i.e. without relying on cables - and the power received on the ground will be converted to electrical energy. As the power source is environmentally clean and inexhaustible, the SSPS is highly anticipated to become a mainstay energy source that will simultaneously solve both environmental and energy issues.

Gamesa and Areva create the joint-venture Adwen

Gamesa and Areva have signed the final agreements, closing the transaction and creating Adwen, a joint venture dedicated to offshore wind, having 700 employees, 50-50 owned by the two companies and registered in Zamudio, Spain.

The joint-venture is responsible for the design, manufacturing, installation, commissioning and services of offshore wind turbines. Combining both Gamesa and Areva wind expertise and extensive track-record, Adwen is ideally positioned to become a leading player in the offshore wind segment, with a 2.8 GW project pipeline and the objective of garnering a market share of close to 20% in Europe by 2020.

The offshore market represents one of the most promising areas for the development of renewable energies over the next decade, particularly in the coastal countries of northern Europe, where the installed base should reach over 25 GW by 2020. Besides, the experience accumulated by both partners in Asia will enable the company to benefit from the huge offshore wind potential of this region, which could reach 17 GW of installed capacity by 2020.

Adwen is chaired by Louis-François Durret, CEO of Areva Renewable Energies and the Board of Directors is composed of eight members, four appointed by each parent company. The General Manager is Luis Álvarez, Chief Operating Officer of Gamesa's offshore activities.

Nordex to build largest wind farm in Uruguay

Nordex SE expands its business in South America and reinforces its business relations with the Uruguayan state power company UTE (Usinas y Trasmisiones Electricas), which has placed a contract for the installation of the "Pampa" wind farm. UTE's project comprises 59 N117/2400 wind turbines, which Nordex will be installing on a turnkey basis. Following construction of the wind farm, the two companies will continue their partnership on a long-term basis under a premium service contract with a duration of minimum ten years.

Nordex will commence infrastructure work on access routes, foundations and cabling etc. in the first half of 2015. The wind farm will go on-line towards mid of 2016 and yield an expected 640 GWh of electricity per year, allowing UTE to provide some 180,000 households with local clean electricity. Nordex will source services and components from a number of local suppliers during the construction as well as the maintenance phase.

The "Pampa" project is located in the largest and thinly populated Department of Tacuarembo in the heart of Uruguay. The project has mean wind speeds of 7.9 metres per second, which will be converted into electricity by Nordex' N117/2400 wind turbines on towers that are 91 metres tall.

"Pampa" is being financed together by KfW IMPEX-Bank and Bayerische Landesbank.

"Nordex is very pleased to have been selected as supplier for UTE again", says Lars Bondo Krogsgaard, a member of Nordex' Management Board. "UTE is changing Uruguay's energy landscape at an impressive pace, and we are proud to be allowed to be part of the realization of UTE's vision".

The dream, finally realised

Editorial: Ajuanne Payne

In Total World Energy's August issue we covered the incredible story of Bertrand Piccard and André Borschberg's Solar Impulse project and the 10 year build up to the world's first circumnavigation of the globe by an aircraft powered solely by the sun. We revisit this story now in our April issue, as the team are finally realising their dream and embarking on that record-making flight…

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Some readers may recall that we first covered the Solar Impulse team and their incredible journey back in August, 2014 as they were making preparations for the world's first round the globe flight using no fuel.

We are now revisiting the story of Bertrand Piccard, Swiss doctor, psychiatrist, aeronaut and explorer and André Borschberg, engineer and fighter pilot. They have finally seen the realisation of a dream that has been over ten years in the making, embarking on the record-breaking flight earlier this month on the 9th March.

The concept at the heart of Solar Impulse – creating a solar-powered aircraft that could fly around the globe without a drop of fuel – first came to Bertrand Piccard in 1999 following his record-breaking round-the-world balloon flight with Brian Jones.

But, you could say that the vision that birthed this dream started many years before Piccard was born, with grandfather and visionary August Piccard.

Bertrand Piccard's grandfather, August, graces the history books as the scientist behind the first balloon ascent into the stratosphere in 1931, asserting on his return that "the question facing us today is not so much whether a man will be able to go even further and people other planets, but how to organise ourselves so as to make life on Earth more and more worthy of living."

It is easy to see where Bertrand Piccard may have inherited his passion for pushing the boundaries of what is possible furthering research in to renewable solutions for the modern world with such a legacy to follow. Piccard is quoted on the Solar Impulse website, summing up that today's innovations "will need to consist much more of preserving, if not improving, the quality of life on our planet.

"How do we reconcile economic and ecological interests and promote the use of new technologies to save energy and create new power sources? Solar Impulse is a symbol of this mind-set."

In our August article we covered the journey, from concept to realisation, that has led Solar Impulse SA to where is today. The Solar Impulse 2 was unveiled in April 2014 and embarked on its first test flight a few months later in June, but it is the lessons learned with the prototype, Solar Impulse 1 that have allowed Piccard and Borschberg and their 80-strong team to reach their goal.

The Solar Impulse 1 embarked on its first test flight in 2009 and went on over the next few years to achieve success after success, attaining a total eight of world records including: longest manned solar-powered flight, at 26 hours, first inter-continental flight in a solar-powered plane and greatest distance covered in a manned solar-powered aeroplane.

The Solar Impulse 2, an upgrade of the first prototype, has 17,248 solar cells covering the plane and rechargeable lithium batteries that store up power for night-time flying.

With a wingspan of 72 meters, larger than that of a Boeing 747, and weighing no more than the average motor car, the Solar Impulse 2 embarked on its round-the-world trip from Abu Dhabi and plans to make a total of 12 stops along the way, to enable pilot changes and local events for government and education.

The unbelievable 35,000 km trip is expected to end in late July or early August this year dependent on weather, and has its own unique challenges to overcome. The plane will have to fly for five consecutive days and nights to cover the Atlantic Ocean, which will be a record breaking achievement once completed.

The wingspan on the Solar Impulse 2 is also eight meters wider than that of the prototype and the plane is better able to combat bad weather than its predecessor - able to deal with partial cloud cover without affecting the energy needed to power the plane.

Piccard and Borschberg are currently only part-way through their trip, but have already achieved their first world record with this plane after crossing the Arabian Sea to Ahmedebad and completing the longest distance ever flown by a solar aeroplane in aviation history.

The collaboration involved in a project such as this is not only necessary – but key to its success. Borschberg explains that "a challenge like Solar Impulse can be met only by bringing together engineers from every background.

"This diversity, sought at every level, stimulates their creativity and provides their strength. It is from comparing and confronting their experiences that new and original solutions have emerged."

The Solar Impulse mission is very much to carry a message – to challenge the world to find new ways of improving the quality of human life through sustainable, renewable, technologies. The importance of a pioneering spirit and a passion for the message behind the technology have led Piccard and Borschberg to realising a dream many wouldn't have thought possible. More importantly, they have contributed further to a potentially emission-free future.

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EY Entrepreneur of the Year

Editorial: Harriet Pattison

It's no surprise that Steven Gray was named as EY's Entrepreneur of the Year 2014: he has successfully steered ROVOP into a highly reputable position within the offshore industry, employing more than 100 staff with an estimated turnover now at £25 million – all in under four years.

As founder of ROVOP – the subsea specialists – which now employs over 100 people and operates across 10 countries, Steven Gray has certainly set the entrepreneurial bar, achieving substantial and impressive success in just three short years.

Together with its co-founders, both veterans of the oil services business, Scott Freeland and Mark Vorenkamp, ROVOP was established in 2011 to provide remotely operated vehicles (ROVs) and services to the oil and gas offshore renewables industry.

Leaving behind a background of law and order – working at law firms Dundas & Wilson, Bank of Scotland and the Lloyds Development Capital private equity business – Gray decided to hone in on what was to become a hugely successful high investment area.

Starting the business with Freeland and Vorenkamp on just £100,000 with the plan to rent out ROVs to the major oil and gas firms working in increasingly prominent areas, such as the North Sea, Gray decided to initially target the offshore wind farm operators, earning his company a reputable name even in its early days.

Within its first 14 months, ROVOP had already secured a substantial £8 million in funding from a variety of sources, including the Scottish Loan Fund which agreed to provide up to £5 million. The Royal Bank of Scotland provided £1 million while the company secured a further £2 million lease finance from undisclosed private investors.

In August 2012, ROVOP announced it has been awarded £60,000 by Scottish Enterprise and Scottish Development International to further support growth both at home and overseas.

EY ENTREPRENEUR OF THE YEAR

With exponential global growth and an estimated turnover as of last year of £25 million, it's no surprise Steven Gray was both shortlisted and awarded EY's Entrepreneur of the Year 2014, receiving industry recognition for his outstanding contribution and for international business growth - "Steven maximised his background in law and banking to become a true entrepreneur," the judges remarked.

Held at The Brewery in the City of London and now in its 17th year, the ceremony celebrates the dynamicity and entrepreneurial spirit of businesses across the UK, offering a strong networking base and opportunities for growth.

"We set out to provide the most capable and modern fleet, combined with the best personnel and highest quality of service, and have found it to be an ethos the energy industry has responded to. Demand has grown consistently and the high level of repeat business we have won makes us believe we are on the right track. We have established a strong reputation with some of the world's leading energy companies and customers ask us to apply the same high standards around

the world, more than 80% of our work is now in international markets and we have completed projects in 14 countries.

"To win an award of this prestige in competition with some of the most successful and innovative businesses in the United Kingdom is hugely satisfying. We have assembled a truly remarkable group of the most capable people in our industry and ROVOP has been successful because of their tremendous commitment. This award is about our business and is recognition of their talent and efforts," Gray said in a statement at the prestigious event.

While Jim Bishop, EY Scotland senior partner, said: "This is the second year in a row that Scots have won more individual Entrepreneur of the Year categories than any other region of the UK, highlighting the depth of Scottish entrepreneurial talent and the strength of our programme north of the Border.

"In a year when Scotland-based events have dominated headlines, it's satisfying to see Scots recognised at UK level for their entrepreneurial qualities and not just their politics or ability to host world-class events."

ROVOP was also awarded the 2013 SPE Offshore Achievement award for Great Small Company and New Enterprise at the Subsea UK 2014 Awards.

NEW FACILITIES

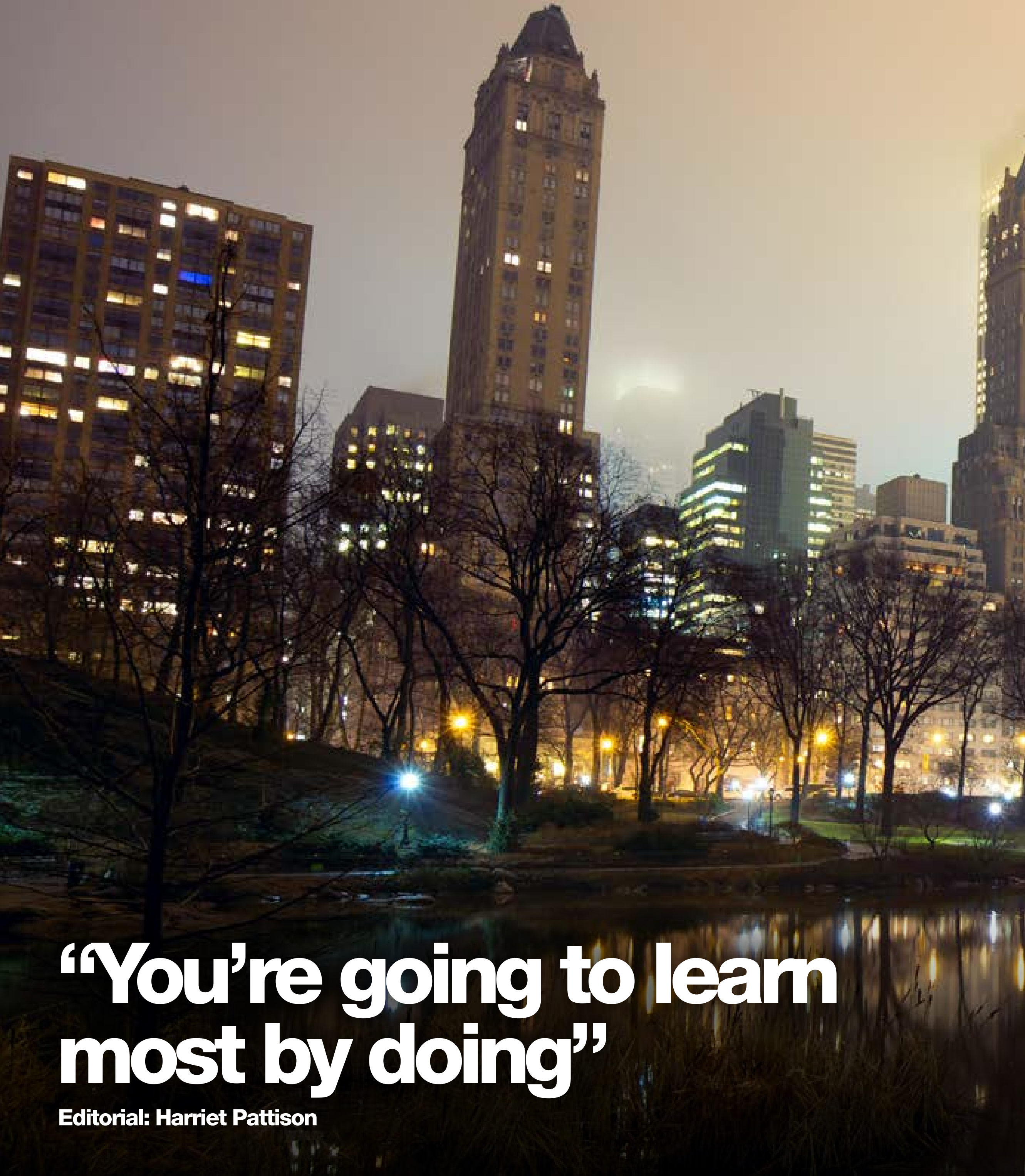
Helping to reinstate its continued success and ever increasing potential for growth, ROVOP, already an approved supplier to many of the big name oil and gas companies within subsea construction, it has now said to invested £4 million into its expanding fleet of ROVs and has established its very own ROV academy.

"Establishing our own HQ is the next step in ROVOP's evolution and enables us to build upon our specialist services in one hub, which is a major development from working across three sites," said Gray.

In addition to its purpose built headquarters, the plot, at 18,500 ft^2, will also feature quality offices, full maintenance facilities with both electrical and hydraulic workshops and not forgetting its £250,000 ROV simulator.

"The addition of the test tank will also allow us to carry out maintenance or fit sensors and tooling and then wet test our ROVs on site ahead of their deployment offshore, as well as use them for demonstration and training purposes. With work contracted already as far ahead as 2020, we look forward to our new HQ providing us with the scope to grow our team and fleet to continue to meet future demand for high quality ROV services," Gray explained in a statement.

If the last three years are anything to go by, the next three will no doubt secure Gray as a truly successful entrepreneur within the offshore industry



"You're going to learn most by doing"

Editorial: Harriet Pattison

Developed from an idea that came from an office move after the events of 9/11, Rentricity has come up with a solution to utilise the waste water flowing through the pipes of the US every single day – to generate electricity. Total World Energy speaks to co-founder and President, Frank Zammataro who explains why in-pipe hydropower is such an innovative concept…

With a goal to harness clean and renewable energy from excess water found within the water mains system, Rentricity (an amalgamation of renewable and electricity), established in 2003, is pioneering a new wave of reliable and renewable hydro-kinetic energy in the US.

With the continual flow of water through underground pipelines - 24 hours a day, 365 days a year – inevitably allows the generation of renewable energy all year round too. Co-founders, Frank Zammataro, Al Spinell and Jason Scharfspitz originally set up the company as a side-line project to help utilise this excess flowing water through the pipelines of New York City.

Zammataro, an ex-Wall St. Executive, spending 21 years at Merrill Lynch, always had a flair for innovation and entrepreneurship. Leaving in 2000, he explains after the events of 9/11 in New York, he moved offices in his then current job to mid-town Manhattan - “It just so happened that when we set up this temporary space, below the conference window there was a water tower on top of a 30 storey building. We stared at that water tower for weeks on end after 9/11 and at one point, my co-founder turned to me and said: ‘Can we use the water in the tower to create power?’ As it was going from the 30th floor down to the ground floor.

“We envisioned an emergency evacuation system that could be powered by water on top of tall buildings. At the time I had zero mechanical or electrical background, but luckily I had a contact at Rensselaer Polytechnic Institute in Troy, New York,” Zammataro explains.

From the initial idea, the co-founders took their concept to academic professors to see if it was a viable one. Although the concept had potential, the professors pointed out that, inevitably, water tanks have a limited supply of water as opposed to the prospect and opportunity found in water systems and water distribution networks with artificial pressure regulation.

So in the summer of 2002,

"I find out what the world
then I proceed to invent it.
—Thom
Please
Do Not Touch
Thomas A. Edison

Frank Zammataro President & Co-founder

Zammataro explains the Rentricity team began cold calling some of the largest water utilities in the US. By the autumn, they were out in the field looking at water infrastructure and the potential it held – "Large pressure reduction valves were just dissipating pressure through friction, essentially wasting energy. So from this, we derived the conceptual framework for Rentricity."

With a business plan in place, Rentricity tried to get government funding before receiving US$200,000 from the state of Rhode Island and the state of Connecticut to research and build a pilot in a real live water system.

Taking five years to complete this pilot, initially working on a part time basis, Zammataro explains Rentricity went commercial in July 2009, joining New York City's very first Cleantech incubator called ACRE (Accelerator for a Clean and Renewable Economy.)

UNLIMITED POTENTIAL

In the US, on a daily basis, an estimated 400 billion gallons of water moves through its water pipes. 200 billion of this is for the energy industry, 100 billion is for irrigation and agriculture with 50 billion for consumption and 50 billion for industries (food processing, chemical plants, oil and gas etc.)

Rentricity made the initial decision to focus on the 200 billion gallons that is the drinking, industrial and irrigation water – "That's our focus and it's a huge market", Zammataro explains. "At a domestic level in the US, it's approaching a $4 billion market and globally, it's a $17 billion market.

"There is so much wasted processed water and energy just there waiting to be integrated back into the electricity grids, or into buildings where the water is flowing.

"I visited a turkey processor in Pennsylvania which processes 20,000 birds every day for packaging and delivery to supermarkets. They use 400,000 gallons of water a day in the different cycles – the aggregate level in the US is that we process between eight and nine billion birds a year for consumption and that's just in the US. We found we could reduce their energy costs by roughly 10%," Zammataro explains.

METHOD?

So, how does this energy generating concept work? Rentricity's technology makes use of the highly pressured water that flows through pipes to be delivered to neighbourhoods and businesses. After leaving the treatment plant, water typically goes through the water utility where the pressure and flow are reduced as the water gets ready to enter the smaller pipes to its end users.

"We can monitor, control and optimize the pressure in the system so that we can get the most electricity potential out of the system," explains Zammataro.

The design and installation of its highly unique energy recovery system, Flow-to-Wire™, will help to harness the recurrent high volumes of excess energy, using it to generate clean electric power. A single Flow-to-Wire™ system is able to produce between 30-350 kW of clean, renewable, electricity which can then be sold back to the grid.

Rentricity is also developing a suite

of Sustainable Energy & Monitoring Systems (SEMS™) - a set of pre-packaged, pre-engineered, skid mounted energy recovery systems, equipped with an integrated set of water quality sensors that will extend the Flow-to-Wire line to between 5-30 kW.

Working in partnership with water pump and treatment equipment maker, Xylem, both companies are demonstrating the new technology in a Pennsylvania site.

Rentricity can also install flow and pressure sensors that collect data and detect leakage for water utilities, particularly if the water treatment systems are located in remote areas.

Because in-pipe water power is very dense, Zammataro explains that the economics of Rentricity's projects are more appealing than many other renewables due to the consistency and predictability of water flows, as oppose to weather dependent renewable solutions.

Rentricity's equipment currently has a 40-year life span with energy savings covering the cost in three to 16 years, depending on the size of the installation and the clean energy incentives that have been put in place.

REMAINING OPPORTUNISTIC

Nearly a decade on since its inception and Rentricity is nearing the completion of its largest project to date: a 325 kW installation at a water transfer station in Palos Verdes, California, for the largest investor-owned water utility in the state, California Water Services Company.

And additionally, with the potential to generate up to 100 kW, Zammataro explains: "We have created the very first energy neutral water treatment plant in the city of Keene, New Hampshire, which is powered by its inflow of pressurized water – so that plant is completely energy neutral.

"We have now exploited every possible area for energy recovery within drinking water and 2015 is a big irrigation water year for us," explains Zammataro. "We have two irrigation projects underway in Idaho and Utah and next year, we will be focusing on generation from industrial water."

It is often said that the best ideas come completely out of the blue, perhaps when you least expect it or are busy planning something else - but from a series of events back in 2001, these helped to encourage three co-founders into creating, developing and establishing Rentricity. So, what's next?

"We have received many enquiries from international engineering companies and renewable energy developers," Zammataro explains. "We are actively pursuing our first project in central and South America, where energy costs are very high. In Mexico, the electrical grid is being deregulated, so the electric companies are looking for ways of fostering cleaner energy.

"So it's very exciting, we remain opportunistic and I think the future is very bright for us."

Keene NH Water Treatment Plant Dual Turbine Instalation

Chile’s big move on energy mix

Editorial: Colin Chinery

With limited indigenous fossil energy resources Chile imports close to three quarters of its total primary energy supply in the form of oil, gas and coal, while recurring droughts have forced the Government to change focus from hydropower to natural gas. And in this diversifying national energy matrix a pivotal role is being played by the nationally-owned oil company, ENAP.

Chile’s geography is unique; a long, beautiful sliver between the Andes and the Pacific Ocean and a coastline extending 4,300km from the world’s driest desert in the north through a populous Mediterranean centre and down to a snow-prone Alpine climate in the south.

It was here in the far south, in the Magellan region in December 1945, that oil was first discovered in Chile, and four years later ENAP, Chile’s national oil company, was formed to commercially exploit the reserves.

Sixty five years on, the Santiago-headquartered ENAP’s operational divisions extend across exploration, production, refining and marketing of hydrocarbons and their by-products; a world class operator with an extensive network for transportation, storage and distribution of crude oil, natural gas and refined products.

Historically R&L and E&P account for some 95% and 5% of revenues and 60% and 40% net profits. “We are capable of producing 100% of Chile’s gasoline requirement, and in the case of diesel we currently account for some 50% of the market,” says CEO Marcelo Tokman.

“We also have 100% of the fuel oil market and 70% in the kerosene. On average we hold

65% across the markets in which we participate."

HIGH QUALITY

"As to fuel quality, the standards in Chile are among the highest in the world and we have invested heavily in keeping up with those standards in our refineries."

In a country of 17.4 million, with limited fossil energy resources, an early ENAP objective – achieved in 1954 – was the creation of an oil refining plant. This was the Aconcagua Refinery, and in 1959 the first logistic facilities for storage and distribution of refined fuels were built in Maipú, followed by the Gregorio maritime terminal in Magallanes.

Two years later in 1962 the Cullen gasoline plant (Magallanes) began operations, and in 1966 a second opened – known today as the Bío Bío Refinery - together with the construction of a multiple purpose pipeline reaching out to San Fernando and on to a storage plant in Maipú in central Chile's Santiago Metropolitan Region.

In 1981 ENAP expanded into the logistic business with storage plants for liquid and gas fuels, and in 1990 the exploration and exploitation of hydrocarbon deposits.

"Our main business lines are Upstream, where we supply all the gas consumed within the Magallanes region, and where we are currently exploiting unconventional gas, mainly tight, and advancing in exploitation techniques.

"As well as this we have

> "Last year was a very good one for us in terms of what we were able to achieve. We ended with profits of $157m - a 15% increase on 2013"

CEO Marcelo Tokman

developed upstream operations abroad in Argentina, Ecuador and Egypt" - three weeks ago an ENAP subsidiary announced it will be investing $30 million to build a 90 km oil pipeline in Egypt's Western Desert.

"In terms of refineries we own the only refineries in Chile, but the oil product market is completely open, and this means our clients can and do import products, which forces us to follow and import parity price policy, otherwise they import directly. And this in fact is constantly happening."

"Last year we started fracking vertical wells. This year we have adopted a new pad-drilling technique, which allows us to drill multiple wells from a single pad, with the corresponding efficiency gains. Next year hopefully we will start drilling and fracking horizontal wells," said Mr Tokman, a former Chilean Energy Minister and a previous head of the National Energy Commission where he introduced energy efficiency and renewable energy initiatives.

The importance of guaranteeing enough power generation capacity and energy supply to sustain national prosperity and economic development can hardly be exaggerated. Since 1990, Chile has been the fastest growing economy in Latin America thanks to sound economic management and integration into the global economy.

But while power demand is booming across Latin America, its electricity infrastructure is struggling to cope, and the World Bank expects the continent's power consumption to more than double between 2010 and 2030 and estimates that $430bn of investment will be needed to meet demand.

Unlike many of its South American neighbours, Chile has limited indigenous fossil energy resources. Even so, fossil fuels account for almost 80% of its total primary energy supply, with the result that Chile imports close to three quarters of its TPES in the form of oil, gas and coal.

IMPORT DEPENDENT

“98% of the crude we refine is imported and 2% is produced in the south of Chile. Our imports are mainly from the region, and this is the only way we can get the margins and compete with the large refineries in the US which have access to much lower priced oil and natural gas,” says Mr Tokman.

“This means that to maximise our purchases we bring 85% of our crude from Brazil and Ecuador, with some coming from Peru and Columbia, and last year we introduced Angola to this list.”

> “This means to maximise our purchases we bring 85% of our crude from Brazil and Ecuador, with some from Peru and Columbia”

In the case of natural gas, external dependence was concentrated almost exclusively on one supplier – Argentina – until the arrival of liquefied natural gas in the summer of 2009 when ENAP - in partnership with British Gas, Metrogas and Endesa - built the first LNG storage and re-gasification plant in Latin America at Quintero in central Chile.

Last month saw the completion of a $30mn project to expand regasification capacity at the Quintero terminal by 50% to 15Mm3/d from 10Mm3/d.

This expansion will double the daily amount of gas transported by truck from

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the facility. An open season to expand the capacity to 20Mm3/d has been launched and is expected to be completed in 2018. Meantime, to increase its operational flexibility, Quintero - in which ENAP holds a 20% share - will need to increase its storage capacity.

Public opposition both to big dam hydropower projects and, mainly, to coal power plants, have forced the Chilean Government to change its focus to natural gas combined cycles for base load power generation. This requires an increasing place for LNG in the energy mix and a new role for ENAP, which plans to expand into the power arena, targeting base load products - principally natural gas burning.

“While there have been a lot of development in the renewables area, over the last two years or so there has been a scarcity in terms of new base load projects such as large hydro, coal-fired plants or natural gas projects. As a result the Government has asked us to see if we can contribute by making new projects viable as fast as possible.

“We have now identified at least two projects that have already advanced in terms of environmental approvals. We are continuing these and are holding conversations with the community to ensure they are fully permitted and have social approval.

“Now we are looking for private partners, hopefully new actors, to construct and operate these projects. Our idea is for them to take control of the projects and for ENAP to take a minority stake.”

Meantime a vastly increasing demand for electricity throughout the country has so far outstripped investment.

Meanwhile ENAP’s announced last year an $800mn per year investment through 2020, an unprecedented long-term plan and a major boost on investment levels of the past five years that have averaged just $286m, mainly on upstream projects.

As a result the company intends to more than double production to 32,000 b/d of oil equivalent by 2020 from a current 15,000 boe/d, with a focus on developing

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unconventional potential in the deep-south Magallanes region.

GEOTHERMAL POTENTIAL

Another feature of this ambitious programme is a strong focus on electricity and natural gas, together with the development of a geothermal plant, the first in South America (Chile has one of the largest underdeveloped geothermal resources in the world with a potential to move from zero to 16,000 MW over a 50-year period.)

While a pioneering privatisation and liberalisation of its electricity sector in the 1980s has formed the foundation for a competitive energy sector that has sustained the rapid growth of the economy over the past two decades, Chile's limited fossil energy resources and import dependency has led to three periods of significant stress.

> "We are capable of producing 100% of Chile's gasoline requirement, and in the case of diesel we currently account for some 50% of the market"

In 2007 and 2008 the country faced a double energy crisis after losing most of its gas imports from its sole supplier – Argentina - at a time when its hydroelectric production was severely affected by drought.

In response the government worked with industry to achieve a rapid adaptation of the power sector to ensure the continuity of electricity supply.

"This company was put under a lot of stress," says Mr Tokman. "Chile was without gas, there was a drought, and the company had to purchase huge amounts of diesel to drive generation previously achieved through natural

gas. This was at a time when prices were at a record high, and all in all we had huge losses.

"But since then we have been not only able to stabilise the company but also produce very positive results. And most importantly - although from last year to this we also faced a very severe fall in the price of oil – we learned from the 2008 crisis that we needed to cover purchases of oil.

"And the policy since then has been full coverage, and this has meant that on our refinery site, which represents almost 95% of our sales, we have not been affected by the price of oil.

"Last year the Board approved a strategic plan for the years up to 2025 and this entails a huge effort in terms of increasing our capex expenditure and investment, passing from $250m - the average on our investments over the last five years - to an annual average of $800m. It's a huge effort."

ELIMINATING BOTTLENECKS

These investments will be mainly in the exploitation of the non-conventional resources in the south of Chile, says Mr Tokman. "We are committed to ensure that there will be sufficient supply for the needs of that region for the next 20 years." In the case of the refineries, Mr. Tokman said: "we are investing to eliminate a number of bottlenecks and enable them to keep on providing 100% of Chile's gasoline needs".

"We have started producing this huge jump from $250m to this year when we have approved investment plans of $776m. At this point we are seeing if some of this might be postponed for next year because of the fall in the price of oil.

"Last year was a very good one for us in terms of what we were able to achieve. We ended with profits of $157m - a 15% increase on 2013 and in terms of turnover we ended with $621m - the first time in our history that we had two consecutive years with a turnover of more than $600m. Net worth increased from $231m to $546m. In 2012 it was only $83m."

Where might ENAP be positioned in say, four years? "We want to continue growing as we have done over the past two years, extend further into LNG, help to increase Chile's base load capacity, and take ENAP to a $1b turnover company."

Joining forces to guarantee power

Editorial: Tim Hands

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Following an agreement first proposed in late 2012 between Mitsubishi Heavy Industries Limited and Hitachi Limited, Mitsubishi Hitachi Power Systems Africa was launched in Johannesburg in March 2014. It was a merger which saw the South African business of Hitachi Power Africa transferred to the newly-formed MHPSA, a primary aspect of which is the provision of six 800 MW Utility Steam Generators for the Medupi and Kusile power stations.

"The thinking behind this started in 2012," explains Head of Sales and Business Development, David Milner, of the merger's beginnings, "and the conclusion reached by the companies was that both Mitsubishi Heavy Industries and Hitachi Power were competing in the same markets, but to be successful in these markets you need both global reach and critical mass. They believed therefore that by working together they would be able to bring together the best of the two organisations and their products, and to have a unit that was able to compete with the other major power companies in the world – General Electric and Siemens. It took about a year to clarify quite how this would be achieved, and the formal announcement of the merger was made around July 2013."

The two companies have since placed their thermal power groups into the joint venture, but have kept their wind, solar and nuclear assets separate. This means that steam, gas and thermal renewable products are all being taken care of by Mitsubishi Hitachi Power Systems Africa, since starting business in South Africa at the beginning of the following March having overcome some further regulatory hurdles.

"This is now one company," continues Milner, "and what the parent companies have done in Japan is really rather clever. Here, they have integrated the two sets of personnel into one team and ensured that across the company there are previous members of both Hitachi and Mitsubishi that work alongside each other now in the same office." Office locations have thus been consolidated, the relevant staff moved, and a completely integrated team is now behind MHPSA's functioning. "In total, in our company, we have now over 50 colleagues from Japan supporting us, to assist us primarily with Medupi and Kusile and further projects going forward, alongside the almost 100 staff we have from Germany, and a further 400 South Africans who come together to comprise Mitsubishi Hitachi Power Systems Africa."

KUSILE AND MEDUPI

The Medupi and Kusile power station projects were among the key South African business of Hitachi Power Africa transferred to MHPSA after the merger's completion. "By far, these two dominate anything else that we are currently doing," states David Milner. MHPSA is responsible for providing the boilers to drive Medupi and Kusile, which will each add around 4800MW to the country's energy supply. They are both coal-fired stations, the former a greenfield site located in Limpopo Province while Kusile is new, in the Witbank area of Mpumalanga Province alongside the existing Kendal power station. "Normally in Europe when these supercritical units are installed, one or two are built in a block, while here we are building two blocks, or power stations, with six units in each – these sites represent some of the largest-scale construction work in the southern Hemisphere currently underway, and we are integrally involved in it. Anybody who goes to the sites is amazed by the sheer scale of the project. It is enormous, the whole power plant is huge and the construction site, which extends beyond the boundaries of the power plant, is an enormous undertaking."

The boilers provided by MHPSA take the coal that is mined next to the power station, and combust that coal which in turn heats water into steam. When this steam is routed through a turbine, it turns it over to drive a generator which then produces the key end product - electricity. "We have a number of similar units running around the world as well as many under construction," explains Milner in testament to the reliability of the equipment provided by MHPSA. "Many of the units are in Europe and are entering commission and commercial operation. We are following the progress of these units, some of which are ahead of Medupi and Kusile in terms of schedule, allowing us to transfer some of the resources out of Europe and back into South Africa for the commissioning phases of our two power stations."The scope of the technology being implemented at Medupi and Kusile comes as the result of vast research and development on the part of MHPSA's two composite companies, with their joining forces requiring

Continues on page 32...

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products to be tailored to African conditions. "Our role in South Africa is to localise the technology so that it is fit for purpose in our local conditions," explains Milner. "Local coals have different characteristics, the availability of water is different, as well as temperatures – all of which requires some modification of the technology to suit the regional requirements."

All of this preliminary work was brought together to achieve the first coal fires at Medupi in the latter stages of last year. This was followed at the beginning of March this year by an even more significant development, with the synchronisation of its first unit, Unit 6, to the National grid. Synchronisation, or first power, describes the generator in the unit being electrically connected into the power grid, so that its power is perfectly aligned with all the other generators in order that it can deliver electricity into the grid. Within the next three to six months, therefore, South Africa will see the Medupi Unit 6's full potential of 794MW being fed into the national grid. As with any project of this scale, MHPSA has had to overcome significant challenges along the way to reach this point in operations. A delay to the initial synchronisation schedule was caused by problems with the boiler blow-through process, used to clean the steam of residue and particles prior to feeding it through to the turbine and one of the final commissioning steps ahead of grid synchronisation. A joint technical task team subsequently set up by Eskom and Mitsubishi Hitachi Power Systems Africa was then tasked with reviewing the blow-through procedure ahead of future tests at both Medupi and Kusile.

The full impact of the electricity now being produced at the Medupi station will be felt within the next few months, with Eskom CEO Tshediso Matona stating that the flow of this electricity into the grid marked "a new beginning." Kusile Unit 1 is scheduled for synchronisation in the first half of 2017, and is stated to enter commercial operations during the second half of the year. A recent replacement at Kusile has seen Swiss firm ABB take over from France's Alstom in a key control and instrumentation contract. A power station's control and instrumentation system monitors and controls engineering systems, machinery and processes, with this change in personnel crucially not set to delay completion of the plant, which along with the Medupi site will be vital in helping to put an end to

electricity shortages currently hampering Africa's largest economy. ANC secretary-general Gwede Mantashe has described the current situation faced by Eskom as a "positive crisis", in that so many households have been connected to the power grid in recent years that demand has increased markedly. The consequent shortages of power lead to regular 'load-shedding', which occurs when there is insufficient electricity available to meet demand, a strain which will be eased significantly by the commissioning of these two new stations.

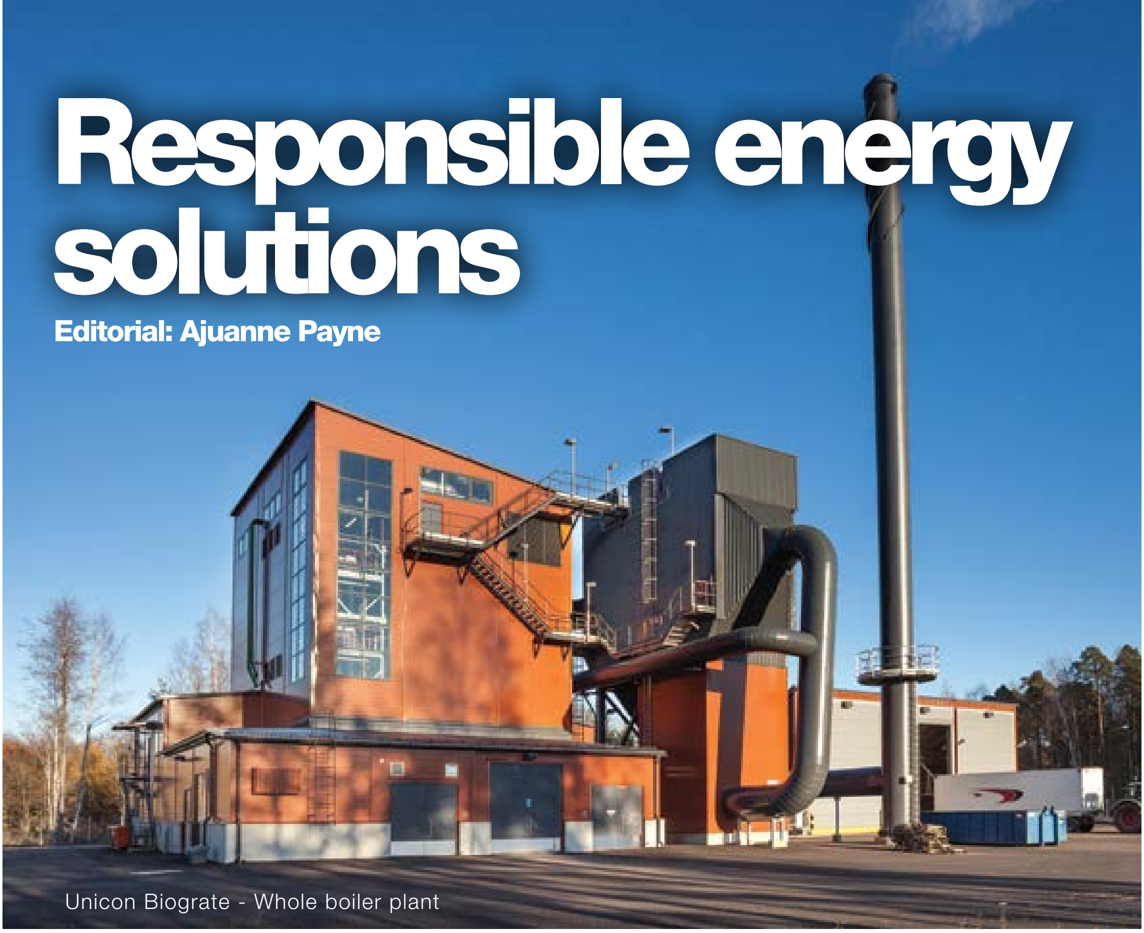
A SIGNIFICANT CONTRIBUTION

The importance of both the Medupi and Kusile stations to the country's energy mix was a point recognised by Public Enterprises Minister Lynne Brown, who added that synchronisation brought Medupi a "step closer to alleviating some of the energy challenges currently faced by South Africa." It will provide a significant contribution to the economies of both South Africa and the region itself in the long run, as Brown added: "We recognise that this is only the beginning, but I am confident that achieving this significant milestone will sustain the dedication and commitment of the Eskom team as they work towards the completion of the project." As it nears completion, Tshediso Matona also described how power station manager Johan Prinsloo and his core operational team had been undergoing intensive training over a number of years to position them to, "operate the cutting-edge technology that makes this power station unique in the world. Approximately 350 men and women are waiting to join the force of South Africans making history when the unit gets operational."

For Mitsubishi Hitachi Power Systems, responsible for the colossal boilers at the heart of operations, Unit 6's delivery of first power to the grid was met with delight. These boilers at Medupi and Kusile are among the biggest that MHPSA has ever built, standing 108 metres high containing 40 000 tonnes of structural steel each. Characteristically, though, there was also a firm focus on pressing forward with the stations' development. "As Medupi's Unit 6 is brought up to full commercial operation over the next few months, MHPSA's focus will move to Unit 5, which will be the next to come on line, followed by the other boilers at Medupi and Kusile." The stations' machinery will be gradually ramped up to provide full commercial power, and offer real progress in the country's battle for sufficient electricity over the coming years

Responsible energy solutions

Editorial: Ajuanne Payne



Unicon Biograte - Whole boiler plant

KPA Unicon, the Finnish boiler plant specialist, is celebrating 25 years in business this year and the success of its recent diversification in to biomass boiler solutions. Total World Energy speaks to Olli-Pekka Aarnio to find out more about the new technologies…

KPA Unicon provides responsible energy solutions and lifecycle services for boiler plant projects in the biomass and oil and gas sectors. It is a company with a flexible approach – handling contracts that vary anywhere between equipment deliveries to full turnkey projects. The company has around 150 energy professionals, a turnover of 50 million euros and are leaders in their market in Finland, with a strong global track record for successfully delivering quality, customised solutions.

The company is still owned by its original founder and chairman of the board, Mr. Pekka Kovanen. Olli-Pekka Aarnio of KPA Unicon explains: "We are a family owned business, founded in 1990, and we are owned by family Kovanen, living in Finland, also home to our HQ."

KPA Unicon is expanding in to global markets; previously the business was mainly focused in the oil and gas sector in Russia and Finland. It is able to offer support for the whole project lifecycle – from feasibility studies, financing solutions, to turn key boiler plant deliveries, operation and maintenance.

Aarnio explains further, stating that "our slogan is: responsible energy solutions and life cycle services. We don't want to just deliver boiler plants and that's it - we want to be responsible and also offer lifecycle services through our service organisation.

"We can participate in maintenance – even operate the plant if the customer wants. We offer service agreements to cover all the support needed to produce energy in an efficient way. We can do retrofit projects, repairs, deliver spare parts and upgrade boiler plants automation system just for an example.

"Our idea is to be very flexible and offer customised boiler plant solutions for customer's needs. We are not just selling different kinds of products, we are providing solutions."

BIOMASS BOILER PLANTS

In the beginning of 2014 KPA Unicon bought a small-scale boiler plant business from Valmet, getting as part of the deal their Biograte combustion system, with over 100 references and the in-depth know-how of biomass boiler plant professionals.

"Previously KPA Unicon's main focus was in oil and gas – in boiler plants," explains Aarnio, "now we have expanded our product portfolio and solutions more to biomass boilers – and the power plant business. Now we have a very wide product portfolio and we are flexible within all areas.

"These biomass boiler products have been in the hands of big companies over the decades, so also a lot of the R&D money of these big companies has been invested. When we got these great products and integrated them with our medium-sized, flexible, project house, we were able to improve the competitiveness of the solutions.

The acquisition will further KPA Unicon's international reach – they are now able

> "We are not just selling different kinds of products, we are providing solutions"

Unicon WSF - Natural gas + Light oil plant

Unicon Biograte - Radiation furnace above the Biograte

> “Our slogan is: responsible energy solutions and life cycle services”

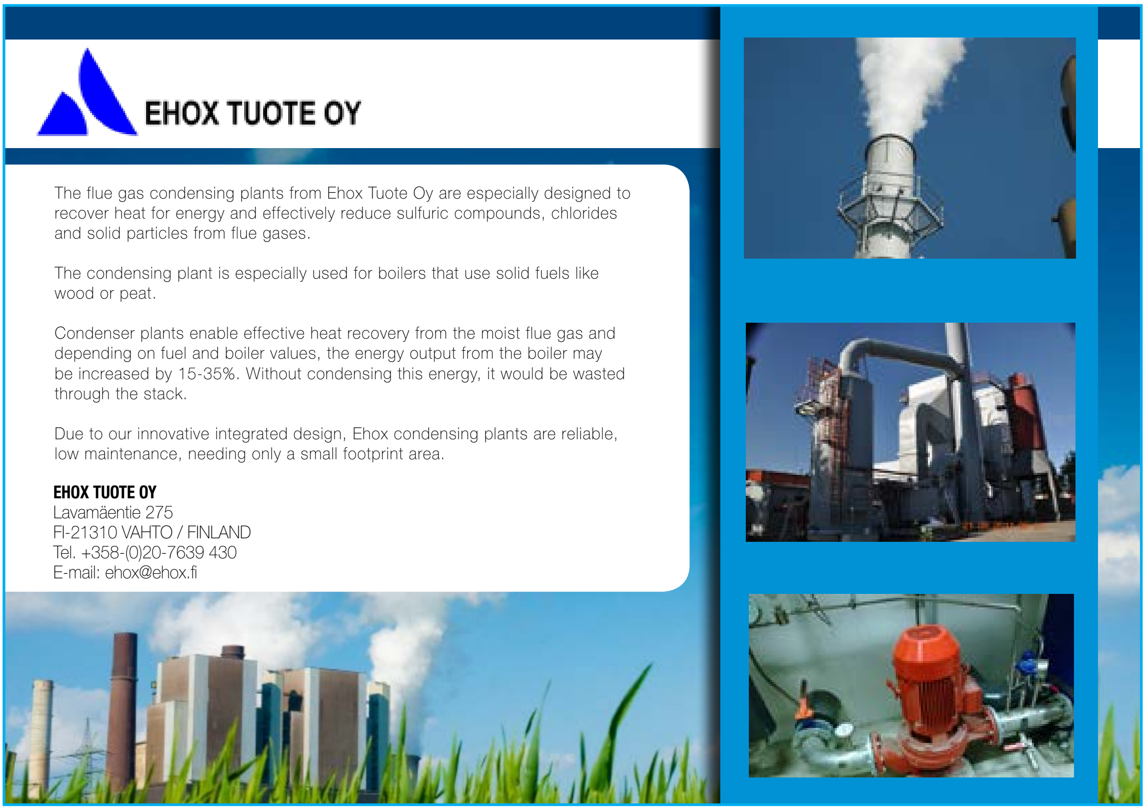
to offer a broader range of products and services to their customers locally and abroad.

“Finland is our home market but our target is to become a global project house,” explains Aarnio, “we see lots of potential around the world with this Biograte combustion system, with the boiler plants and power plants. We have sales representatives all around the world and we are actively looking for tenders internationally. We have many interesting cases in the negotiating phase at the moment.”

TECHNICAL CAPABILITIES

The biomass solutions KPA Unicon focus on typically use fuels such as: bark, sawdust, wood chips, peat, forest residues, landscape residues pellet and briquettes. Aside from the Unicon Biograte boilers, the company also can also supply and install Unicon Pellet boilers and Unicon BFB boilers – ranging from 3 to 25 MW in capacity.

Aarnio explains further: “For biomass solutions, our number one product is this Biograte combustion system, which is this circular grate for biomass combustion and it’s the heart of the plant. We have different grate sizes which are standardised and sizes can go from 3 MW up to 25 MW for a unit. We can put many of these side by side so we can achieve higher boiler capacities. For example – at the moment we have ongoing projects for two 15 MW boilers that will generate 30MW hot water to district



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"We can tailor this kind of boiler for the customer's needs – from a hot water boiler for a district heating company, to a high pressure steam boiler for customers who wants to produce electricity. We also have process steam solutions for industry need.

"The second biomass solution we have is the Unicon Pellet, which is a pellet dust burning solutions and the last we have is the Unicon BFB - which stands for bubbling fluidized boiler - also for biomass burning."

The company, of course, is still very much focused on its oil and gas solutions, offering fire tube boilers or water tube boiler plants with capacity ranging anywhere from 5 MWth to 500 MWth. Aarnio explains that a "single boiler can be up to 60-100 MWth. We also have solutions for burning more challenging gases like waste gases from different kind of industries. Our strategy is that these plants are typically very modularised and pre-manufactured in our own factory, so site installations and the project time will be shorter – ensuring high quality and competitive price."

Sales Manager Olli-Pekka Aarnio

THE ELENIA LAMPO PROJECT

Elenia Lämpö is a company that offers environmentally friendly heating solutions for its customers – generating, selling and distributing district heat, electricity and natural gas. KPA Unicon delivered a Unicon BioGrate biomass-fired heating plant to Elenia Lämpö for district heating in Turenki, Finland, at the beginning of this year, with the turnkey project including all process equipment, buildings and installation work also the commissioning and training for the operational personnel included to the deal.

The plant has an output of 10 MWth and is fuelled by locally sourced biomass fuel, such as wood chips and peat. This project is a good example of the utilization of locally sourced and environmentally friendly fuel to produce energy. The project will increase the region's renewable energy use to 85%, while significantly reducing harmful emissions. From an economical point of view, replacing natural gas with cheaper biomass enables Elenia Lämpö to provide district heating to their customers with competitive prices for the future.

KPA Unicon celebrates its 25th anniversary this year as a responsible energy solutions provider and it is its flexible approach and growth in to new markets that has definitely played a key part in the company's success over the years.

Aarnio explains the

importance of the milestone for the company: “It’s been a long journey - there has been lots of different markets, different products in this time. It’s a very big milestone and we are proud that we are still going nowadays - better than ever. We will have a celebration in the summer for the employees of our company.”

STAYING AHEAD OF THE COMPETITION

KPA Unicon has diversified over the years and focused on developing its expertise and capabilities in order to stay at the forefront of the boiler plant industry. As a company, they try and anticipate what their customers will need and cater to that demand. Aside from its expansions in to renewable energy, another area where the company has done this is in its ability to offer financing to customers internationally.

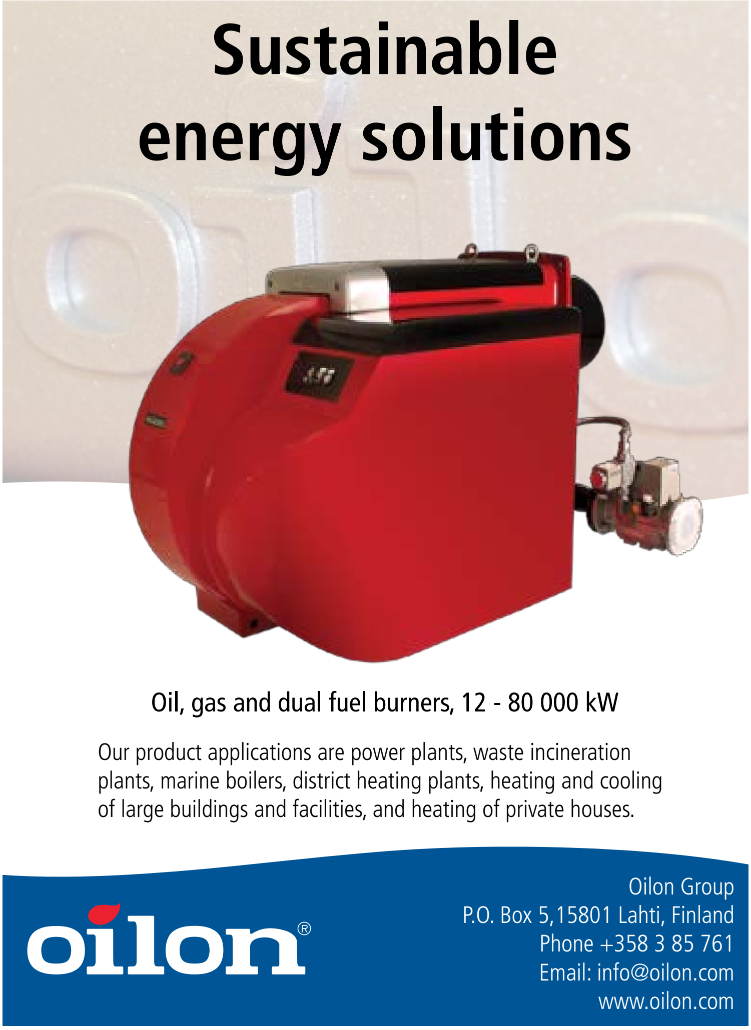
“We can help customers with financing,” explains Aarnio, “and that’s very important - especially in countries all around the world where you cannot get financing as easily as some energy companies in Finland or the UK.

“We can, for example, help our customers by taking the government owned organisation called Finnvera into the discussions of financing. They help foreign customers of Finnish companies to get loans - so they support exporting from Finland. We also have our own financing company so, if needed, we have the possibility to partner in projects with a small equity share. It is something which brings lots of value in some markets.”

The company has also made it a key focus to have close and respected relationships with its suppliers and sub-contractors over the years. This strong base of contacts will contribute positively to the company’s plans for expansion and is evidently another key to the KPA Unicon’s success.

“We have good products,” explains Aarnio “and we have good project management skills in our company and supplier relationships so we can guarantee a competitive price. Also we have created a reputation for good quality - which is also very important. We have a very strong presence and we are a trusted partner.

“I think that’s the main thing - we have managed to get customers trust and at the same time we are competitive with the price, with good products. I think that’s the combination for success,” concludes Aarnio ⁝



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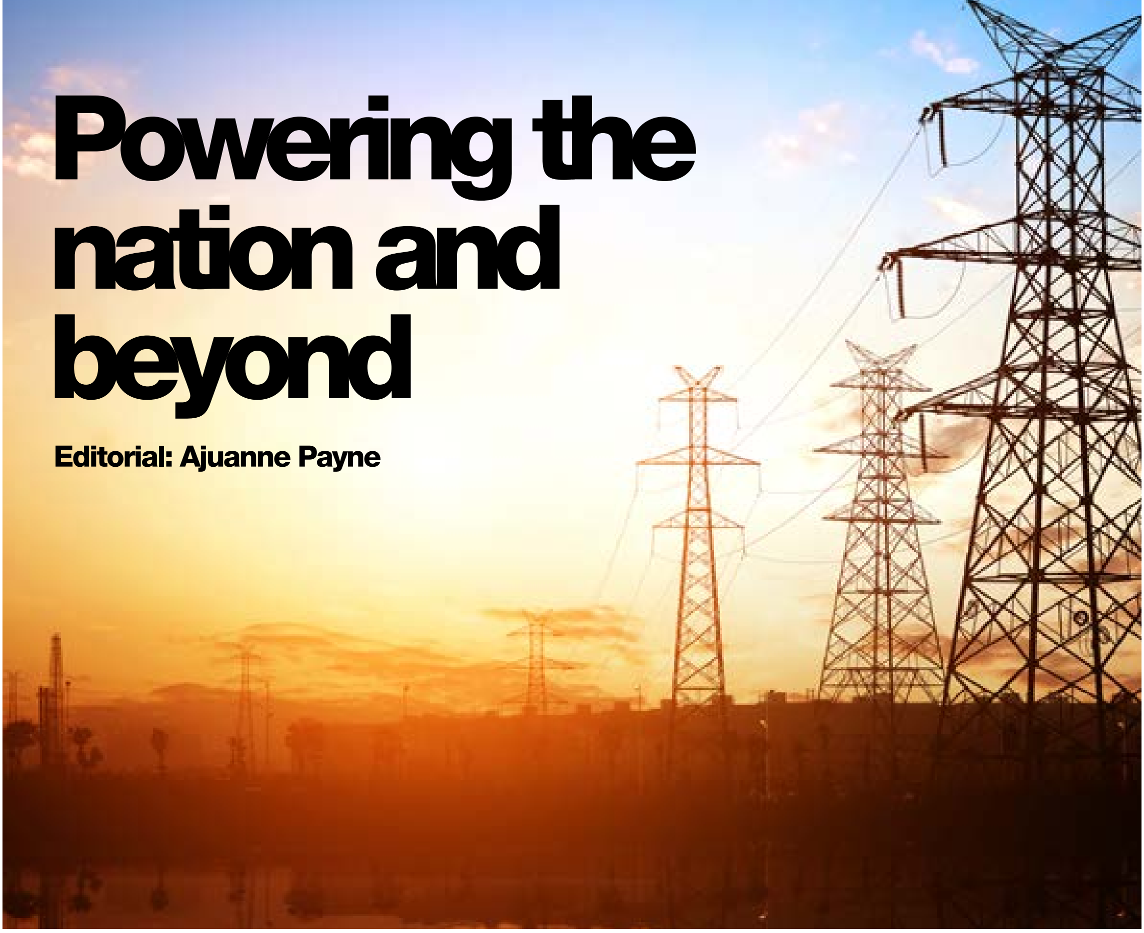
Powering the nation and beyond

Editorial: Ajuanne Payne



Arguably, the most reliable power utility in Sub-Saharan Africa, NamPower has been in operation for more than four decades and is currently planning investments of more than NAD$30 billion over the next decade to further develop and ensure the electricity infrastructure of the nation into the future. At the helm of the power utility, managing director, Paulinus Shilamba, speaks to us about the steps the company is taking to ensure Namibia's security of supply for the future.

Born out of the then South West Africa Water and Electricity Corporation (SWAWEK) formed in 1964, NamPower was established in 1996 as the power utility company for the country.

NamPower's core business is the generation, transmission and energy trading of electricity. The company supplies bulk electricity to Regional Electricity Distributors (REDs), Mines, Farms and Local Authorities (where REDs are not operational) throughout Namibia.

Namibia owns a large transmission system and a network of 132 kV to 400 kV of overhead power lines, spanning many thousands of kilometres throughout the country.

Mr Shilamba explains that "the company has come a long way since its establishment - we have four power stations in the country. The first is Van Eck, which is a thermal power station with a capacity of 120MW, using coal, and the second power station is a hydroelectric plant on the Kunene River, on the border between Angola and Namibia. Initially it had a capacity of 240MW, but 2-3 years ago we added another 92MW turbine generator so the installed capacity is now 340MW.

"Then we have two small thermal power plants - Paratus, with a capacity of 24 MW, and another small power station, ANIXAS, with a capacity of 22.5 MW – both at the coastal town of Walvis Bay."

With the fast economic growth being experienced across all of Southern Africa equally reflected in the Namibian economy, NamPower is taking the steps necessary over the coming years to ensure its energy future and to develop the infrastructure needed to make it more independent and decrease reliance on imports.

The theoretical installed electricity capacity for Namibia is around 510 MW, with maximum demand at around 550 MW. The maximum installed capacity is theoretical as some of the facilities in the country do not consistently produce electricity to their maximum capacity. For example - in the case of the hydroelectric Ruacana facility, maximum capacity is achieved in the rainy season but almost halved in the dry season.

Mr Shilamba explains that NamPower "is currently trading with four countries in the region, through long-term power purchase agreements with Eskom of South Africa, ZESCO of Zambia, ZPC of Zimbabwe and Aggreko of Mozambique. We are also trading electricity on the Southern African Power Pool through their trading forum.

"On average per year up to 60% of our power requirement comes from imports and only 40% is generated in the country. Of course, with the shortage of electricity experienced in Namibia and also the SAPP region, we are presently analysing the business case for the construction of two new power stations."

As a member of the Southern African Power Pool (SAPP), NamPower trades electricity with its neighbour members, as well as planning mutually beneficial projects and infrastructure developments that benefit and strengthen the Sub-Saharan region - such as the Caprivi Link Interconnector.

INVESTMENTS FOR THE FUTURE

The starting point for NamPower and a key strategy for securing electricity supply nationwide well into the future, are planned investments into its own generation capacity. With around NAD$30 billion in capital budget set aside solely for this purpose, the company has dedicated itself to making the investments not just for security of supply, but in preparation for the expected hike in demand as a result of the booming economy.

Mr Shilamba goes in to detail about these investments: "We have two power stations in the planning phase. The first one is a 250 MW thermal gas power plant, to be up and running before the end of next year. The other one is the Kudu power station near the town of Oranjemund in the south of Namibia, to be developed by 2019.

"The 250 MW thermal gas power station will cost about five billion Namibia dollars and NamPower will team up with the private sector to develop this facility for the country.

The same applies for the Kudu power station, with NamPower owning a 51% shareholding and the other 49% taken up by the private sector. This is a very big project for the country, which is going to cost about 15 billion Namibian dollars.

"In the long run we are also looking at a new hydro power plant to be constructed on the Kunene River, about 120 kilometres downstream from the Ruacana Hydropower Station, on the border between Angola and Namibia. It will be developed as a joint-venture project between Angola and Namibia with each country owning 50%. It's going to have a capacity of 600 MW and will cost about 14 billion Namibian dollars."

The company is also planning on spending close to NAD$10 billion over the next five years on strengthening the backbone of its operations – the transmission capacity. This is not including investments by the private sector, which will also contribute significantly to improvements in the transmission and generation capabilities of Namibia. Mainly focused in the renewables sector, NamPower have got an IPP framework with the private sector to set up power stations that will provide electricity to the nation by way of power purchase agreements with the utility.

"In Namibia we have sunny skies almost all year round and a lot of wind at the coast, so most of the private sector development generation projects are in the field of renewable energy development - and we actively support them. This is on top of what NamPower is already committed to and the investment by the private sector is estimated to be in the region of 10 to 15 billion Namibian dollars."

THE CAPRIVI LINK INTERCONNECTOR

Mr Shilamba has come a long way in the industry since beginning his career as a young electrical engineer in the Ministry of Mines and Energy and working his way through a series of promotions there and at the Electricity Control Board before becoming the managing director of NamPower in 2006.

After a long and successful career in the electricity supply industry in Namibia, when it comes to talking about the Caprivi Link project Mr Shilamba explains that "that's probably the most important highlight of my career - one of the most important projects which has been developed under my leadership and really one of the highlights during my tenure as the managing director of this company."

The Caprivi Link Interconnector was completed in 2010 and secures reliable power transfer between the east and the west of the SAPP. It is also ABB's first HVDC Light installation to be constructed with overhead lines and was the highest rated and longest system of its type in operation when it was built, costing around NAD$3.2 billion to implement.

"The importance of this link is that it basically allows you to diversify in the trading of electricity," explains Mr Shilamba, "because, previously and traditionally you just relied on South Africa and Eskom through the 400 kV link and of course we have to diversify - we have to now enter into new partnerships, new power supply agreements with the north, especially with Zambia, Zimbabwe and Mozambique.

"So, with the Caprivi link now in place, we are actually in the position to import from the north, and to sell power to the north. For example, with the development of the Kudu gas field in the south, one of the important off takers for the excess power from that development is the Copperbelt Energy Corporation (CEC) in Zambia. I am very happy that we managed to implement this infrastructure during my term as the managing director of the company."

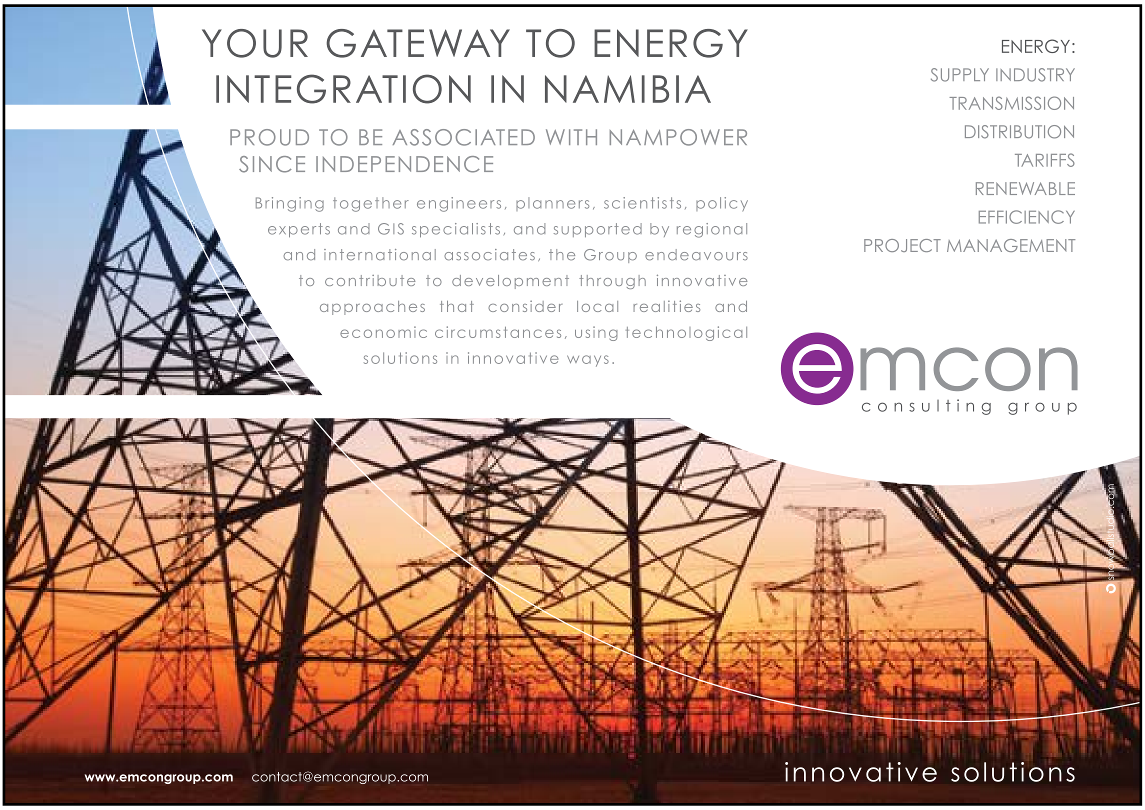
The 970 km, 350 kV line is just one of the projects that are strengthening ties between the countries in the SAPP and is an important measure Namibia has taken as a precursor to the planned developments in its generation infrastructure.

KEY TO SUCCESS

NamPower is a world-class utility and one of the most reliable in Southern Africa. They have managed to keep the lights on despite the power supply challenges in the region and have not effected load shedding in the country, while also significantly investing in the electricity infrastructure of Namibia over the past decade – with significant investments ongoing and exciting developments on the horizon for the country.

But, underpinning all this is the skill of the employees of NamPower. Mr Shilamba explains that "our human resources are very important - the skills in manpower which we have managed to sustain over the years. I am very happy because NamPower is a company which is run by professionals in all spheres of business, who have top of the range professional skills. We have managed to keep those skills level and constant and I cannot really ask for more.

"That's the reason why NamPower is successful – because of the quality of skills employed and the commitment of our employees to manage this company professionally and effectively." Concludes Mr Shilamba



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Capitalising on Middle Eastern promise

Editorial: Tim Hands

For many years now, some of the most significant companies in the Drilling and EPC Service sectors have been consistently ramping up operations across the Middle East. Here we take a look at four of the major players who have established themselves, and now offer complex and innovative methodologies to achieve huge and successful projects, as well providing diversified services to the oil and gas and renewable energy industries.

Lamprell is a company which has enjoyed a presence spanning over 35 years in the United Arab Emirates, and conducts operations throughout the region, playing a key role in the development of an energy industry so strong in the Middle East today. Now, it is the regional market leader in the rig construction business, and is among the leading providers of diversified engineering and contracting services both to the onshore and offshore oil and gas and renewable energy industries. Its primary facilities are all located in Hamriyah, Sharjah and Jebel Ali in the UAE, with around 10,000 people employed across its multiple sites and services. In addition, Lamprell also has facilities in Saudi Arabia and combined, the totality of its operations cover approximately 899,000m square, with over two kilometres of quayside also under its jurisdiction.

As well as an international reputation for complex process modules and topsides, since its initial public offering in 2006, Lamprell has worked ceaselessly to establish leading market positions in the construction of shallow-water drilling jackup rigs, liftboats, land rigs as well as a peerless reputation for rig refurbishment. Its specialism is in North Sea projects within its offshore and onshore arm, while renowned high build quality and the capability to provide wind turbine foundations and transformer stations has helped to secure the success of the renewable energy side of business.

> “The Kvaerner contract confirms Drydocks World’s position as one of the industry’s leading suppliers of platform substructures”

The focus for Lamprell, at present, is maintaining its leading market position in the various construction areas in which it enjoys so much success, while further developing its strong and growing reputation for process modules and topsides for use in the energy industry. Close client relations at all stages of a project have allowed the company to benefit from the strong support of all its major clients, which has in turn improved productivity, and driven down costs, all of which have helped enormously to enhance its competitiveness in the field. This has been further strengthened through Lamprell’s optimising of yard lay-outs, and adopting the very best of practices from pioneering European and Asian yards.

Lamprell is a vastly different organisation today from the small family-run business which started up in the UAE in 1976, when various members of the family moved to Dubai. For the first two decades the company focused on small offshore energy sector projects, before diversifying into the new build construction market for the

offshore oil and gas sector in the late 1990s. It was in collaboration though with FPSO owner/operator SBM and the builders at Dubai Drydocks, now Drydocks World, that Lamprell produced a number of complex modules for several high-profile FPSO projects. These constructions, made between 1998 and 2003, were central to informing the energy sector of the industrial capabilities to be found in the UAE, while the extension of its business expertise into the renewable energy sector required further expansion of its facilities. This saw its one yard in Sharjah joined by two other facilities, Jebel Ali and Hamriyah; a necessary growth to cater for the entirety of the Group's services, customer base and the vast geographical range of its operations.

DRYDOCKS WORLD

One of the most prolific shipyards in operation, Drydocks World's Dubai facility is the largest shipyard in the Middle East and the flagship company of the Dubai World subsidiary. It is a ship repair yard of great renown, with the capability to also provide vessel conversions, new building and offshore construction. Dealing primarily in Ultra Large Crude Carriers and Very Large Crude Carriers, the facility handles an average of 350 vessels each year, and has repaired over 7500 across its 30 years of operations to date.

The shipyard is spread over 200 hectares and has a 350m wide entrance channel alongside repair berths of around 2,400m. Also boasting one of the largest and most well-equipped steel fabrication shops in the Middle East, Drydocks World's ship repair and conversion projects are bolstered by a dedicated steel shop with a monthly fabrication capacity of over 2000 tonnes, to be increased to over 5000 tonnes of steel by its New Building fabrication facility. A multi-discipline engineering department then provides support to the new building, conversion and repair business streams. This is a department with comprehensive design, draughting and Project Engineering facilities, and one staffed with qualified and experienced personnel employing the latest industry software to allow full design analysis and detailed engineering draughting.

Already this year, Drydocks World has enjoyed significant success across the arms of its business. Among the most notable of these was its securing of a contract from Kvaerner to carry out the fabrication of components on the Johan Sverdrup Riser Platform Jacket, to be deployed in the Norwegian sector of the North Sea when completed. This contract is part of a much wider spike in demand for the company, which according to Chairman Khamis Juma Buamim, reached 93% of capacity for the year in February.

"This contract confirms Drydocks World's position as one of the industry's leading suppliers of platform substructures," stated Buamim. "Drydocks World has delivered numerous world-first mega projects, demonstrating our capabilities and commitment to innovation. We look forward to working with Kvaerner, having previously completed two substructures for semi-submersible drilling rigs."

Also reported in March this year was its berthing of 11 oil rigs simultaneously, a company record bettering that set only a month previously of nine rigs. The news comes amid much greater than expected demand from the oil and gas sector, and is central in Drydocks World's stated goal to become one of the leading offshore yards in the region.

Drydocks World is also seeing significant demand from Greece with George Stathakis, Minister of Economy and Maritime Transport, Tourism and Infrastructure, recently receiving a UAE delegation of industrialists & businessmen at his Athens office, in the interest of developing relations and to strengthen cooperation. Khamis Juma Buamim explained that, "the traditional Emirati relationship to the sea has a likeness to the historic relationship Greeks have with the sea. We have learned from and relied on the maritime sector as a source

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of livelihood, communication, cultural, commercial and economic trade with the world."

Buamim went on to outline how mutually profitable the collaboration could be: "There are strong relationships in this sector between the UAE and Greece. Greece sits on the throne of commercial maritime and world shipping having over 4532 ships, supporting maritime innovation, industry, shipbuilding and repair, while improving technical solutions in ship repair & maintenance, shipbuilding, services, offshore supply and refuelling. We appreciate the pioneering position played by Greek maritime companies and ship owners and are extremely keen to build strong and excellent relations with our partners in Greece."

> "We trusted ODC and we have been rewarded by its willingness to find efficient solutions"

EVERSENDAI GROUP

Another company with more than three decades of experience in the Middle East to its name, the Eversendai Group established its Oil and Gas division in 2010, having begun life as a structural steel erection company in Malaysia. Since 1983 it has established itself as a leading global organisation in delivering highly complex projects with innovative constructions and for a range of purposes – from high rise buildings, power and petrochemical plants to concrete building structures in the Asian and Middle Eastern regions. A public company in Malaysia,

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Eversendai founder Tan Sri A.K. Nathan, set up the original group and retains 72% of the Eversendai Corporation, with his son Narish Nathan at the helm of the UAE aspect of the business today. Since its decision to take on the oil and gas market, Eversendai Offshore has become an established EPC contractor, specialising in complex fabrication projects which range from medium sized turnkey projects to large EPC projects, from its facilities in the UAE. Of the group's 10,000 strong workforce, almost 7,000 are based in the Middle East, while by far its largest presence is the 4,000 employees in the UAE, expected to increase to 6,000 by the end of the year.

A new Eversendai yard at the Maritime City Free Zone in Ras Al Khaimah, UAE, currently spans over 200,000 square metres, and is part of Eversendai's strategy to double its revenue to RM2 billion by 2017. Specialising in complex fabrication projects, Nathan explains that this yard, "will be the largest of the other fabrication faculties. Per annum, between the six facilities, we will have a combined capacity of 250,000 tonnes of fabrication."

Expansions are already being mooted to the new yard, which is expected to measure 300,000 metres square by the middle of this year, and will be followed by an increase in Eversendai's waterfront to 700 metres. "By June 2015 in the UAE we will have 50 hectares of land in one country, inclusive of the Sharjah facility," states Nathan. "This is the largest investment we have made in one country and will act as a support unit for the company."

Investment like this has allowed Eversendai Offshore to launch itself into new and ground breaking territory, namely in its award of an EPC contract for two GustoMSC NG-2500X liftboats, from Vahana Offshore. "This is a private arm of the holding company of my father's investments. We are not building to sell, we are building these to look for long term lease contracts," explains Nathan of the project's significance to the company. Eversendai Offshore announced at the beginning of 2015 the completion of the keel laying for these two units, marking the second major milestone for the two newly built self-propelled jack-ups scheduled for delivery in 2016. Nathan added his confidence in the project's achieving its stated aim: "We are positive that all

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our efforts and initiatives that have been set in place will lead to more opportunities for the group to secure new contracts on a global scale."

OMAN DRYDOCK

The Oman Drydock Company's world-class ship repair yard is located in Duqm, in the Al Wusta Region of Oman on the south-east corner of the Arabian Peninsula, and is thus ideally situated to take advantage of the passing oil trade in the Gulf region. Billed as the first project in Oman, a country whose ships historically travelled all over the world, this is a drydock not just for Oman, but one which is set to benefit the whole region. The US$1.5bn shipyard, which is one of the largest and well-equipped in the Middle East, was established in September 2006. It has dry docks which can accommodate any size of vessel, alongside one of the longest docks in the Middle East at 2.8km, with room to double in size again if needed. The yard has so far worked on a wide variety of vessels, from VLCCs to container ships, LNG and LPG carriers to chemical carriers, and dredgers, RO-ROs and barges. Its state-of-the-art modern infrastructure, experienced team and strategic location look set to place ODC as one of the preferred dry dock companies across the globe.

ODC took a major step in increasing its market share of global ship repair work after completing its first major conversion job, the Greek-owned crude oil carrier 'Olympic Luck', to a very large crude carrier, which saw bulk head covers removed and replaced to allow for more efficient loading. "The vessel weighs more than 319,000 tonnes and is close to 314m in length. More than 1,000 men worked on the job which involved 3,000 tonnes of steelwork and it was completed in around 80 days," said Dr Abdulmalik Bin Abdullah, chairman, of the project.

This is demonstrative of ODC's intention to be among the leading shipyards in the world for new build, conversion and repair, and is a quest furthered by its celebrating its 300th drydocking at the turn of the year. Springfield Shipping Company General Manager Dimitris Patrikios, said ODC's ability to deliver the highly complex conversion project could lead to future work with the yard. "This was a unique project which helped to show the professional expertise of ODC," he said. "It was the first time ODC has taken on a project of this scale. We trusted ODC and we have been rewarded by its willingness to find efficient solutions."

‘Global experience, local approach’

Editorial: Elizabeth Hardy

An independent and multidisciplinary, yet international, organisation, now celebrating its 65th year in providing efficient solutions for engineering, construction and procurement management within the industry and with its acquisition of the Industrial Engineering Department of Royal Haskoning DHV earlier this year, KH Engineering is on track to continue providing technological solutions and added value to clients further afield in years to come.

Founded over six decades ago from an entrepreneurial partnership between Willem Keyer and Henck Ness, Keynes aimed to provide engineering services to the chemical process industry in the Netherlands.

Following this, the company was brought into a merger with Matthew Hall in 1974 which was later acquired by Amec in the early 90’s. Just four years later, Amec introduced a new Dutch shareholder by the Koop Group and the company later changed its name to KH Engineering.

In 2003, KH Engineering entered into a corporation with the Ludan Group, now with over 1,000 employees, which led to a formal acquisition in 2005.

Celebrating its 65th anniversary this year, Total World Energy speaks to Commercial Director, Kees Vonk, who explains the early days of KH Engineering, serving as an engineering company, focused on a variety of industry sectors, including oil and gas upstream, downstream, petrochemicals and energy-related projects both in the heavy and manufacturing industry.

Today, operating out of several offices, this successful project management company now has bases in the Netherlands and Belgium with a hardworking team of over 500 employees.

“We are able to serve clients from the initial phase of the

project from the conceptual peak or the conceptual study," explains Vonk. "So we are able to deliver to the clients in that early stage - this is one of our most willing products as it gives a good estimate of the investment.

"So the clients can have early decision processes running in their business lines and then when the client decides to go ahead with the project, we detail the whole concept through the normal project stages - the basic and detailed design, the procurement phase, the construction and commissioning phase - so we are able to serve the client from the beginning right through to the hand-over of the completed project."

"We are serving the market for EPC/M contracts – then we end up with mechanical completion and we are guaranteeing the project objectives and volumes of the project.

"As an engineering company, we tend to sell out our services if the client wishes to convert an estimate to an EPC, so we are willing to execute along that strategy, based upon our own study results. This helps to speed things up and potentially enter into new business with the client. While they are focusing on their core business, we may win the EPC contract, keeping the project with the engineer. This would also provide a quicker schedule for the client, bringing their product into the market place within a much more efficient timeframe."

GROWTH STRATEGY

As part of the company's and Ludan Group's significant growth strategy, it recently acquired the Industrial Engineering business line working in the Netherlands of Royal Haskoning DHV earlier this year. "With that acquisition, we have increased our capacity to run EPC projects and to deliver more capacity on conceptual studies, so this is beneficial for KH Engineering," explains Vonk.

By adding further industrial expertise and experience, KH Engineering has enhanced its core competences of engineering, procurement, construction management and consultancy, strengthening its portfolio and continuing to grow and expand within the regions.

In line with this growth strategy, a joint taskforce will be set up in order to implement the strategic

Commercial Director Kees Vonk

collaboration between the two companies, providing a complete portfolio of services to clients within the Zaandam region.

“We established within our engineering company a special task force – The Terminal Task Force – which has been implemented to run projects in sustained capex and Brown Fields capex for terminal operators,” explains Vonk.

In addition to strengthening its portfolio and growing within the surrounding regions, KH Engineering is hoping its client base will also be significantly boosted in the upcoming period as a result of the recent acquisition.

“The acquisition is in line with KH Engineering’s growth strategy. By expanding our portfolio, we can strengthen our position in the market. As a result, we will be better equipped to provide our clients with the desired level of quality in all disciplines, for complete projects, consultancy and programmes,” explained Mr Jansen, CEO of KH Engineering, in a press statement.

This acquisition will see KH Engineering become an organisation with almost 600 employees and in addition to the EPCM projects, more EPC projects and framework agreements can be implemented.

“Through the acquisition, we have also gained more experience in the oil and gas upstream so this is also beneficial for us and why we decided to transfer a small part of the business. What for them was too small is for us a nice added value for our existing company,” Vonk adds.

The growth strategy plans were decided upon a few years ago to help expand its portfolio with the acquisition of several other companies – “We are now also close to our strategic goal for the Netherlands.”

Diversifying its range of services and following clients further afield, Vonk explains KH Engineering remains eager to grow and expand its presence into other countries. Whilst still maintaining a local approach, venturing into these new environments has helped to establish KH Engineering with an experienced and global approach - “We started up our business in Belgium in 2007 and this is our goal and strategy to build up our business - our responsibility is Western Europe. The Ludan Group does have its presence already well-established in Central and Eastern Europe - with operations in Romania, Balkans and Russia - working on the market over there and as group members, we identify synergies between each other to better serve clients together.“

It is not therefore by chance that, since its incorporation in 2005 within the Ludan Group, KH Engineering has established itself in a range of markets, building large installations, completing refurbishment and optimisation projects and providing reliable and cost-effective solutions.

“If I look to the Netherlands, there are still some investments coming up and they are in the market now,” Vonk explains. “We have investments planned for storage and investment plans on the energy market like converting biomass to energy.”

Developing many well-known projects throughout the Netherlands, Vonk explains, there are further energy-related projects scheduled for Belgium too, e.g. valorising biomass. Within the downstream sector, KH Engineering have many large-scale projects already commissioned in both Rotterdam and Antwerp.

"And although the overall investment portfolio over all the markets is slowing down, there are not a lot of large investments planned - there is still running business in the process."

A methodology to create project budget, iNVESTIMATE, although still in its early stages, is really beneficial for the project lines and very early decision processes in the business stages. An amalgamation of 'investment' and 'estimate' – "This methodology, with our conceptual strengths, brings solutions to clients for investment decisions," explains Vonk. "This is really for us to enter into the market and convince clients of our knowledge, not only over the technical aspects of a job but also on the financial part, those are the two predominant factors."

A BRIGHT FUTURE

With the Stoc Expo held earlier last month from 17th-19th March, representing Europe's leading international event for the tank terminal industry, KH Engineering is now in its sixth year of attendance. One of only a few engineering companies present, Vonk explains it represents an important part of the company's growth strategy.

"So we are serving in the Netherlands and in Belgium, almost all large operators. Our attendance is good for business, especially being one of the only engineering companies at the Stoc Expo and this is why we decided to be there all those years ago.

"We don't have a strategic contract with Royal Haskoning DHV but we do serve to have clients in common – we have noticed that clients are now looking to us and to them as a combined force. Some of the clients we are serving together, while others we are currently serving separately, are actually looking to join both of us. We currently have three clients where we serve together, focusing on the entire portfolio," explains Vonk.

Looking to the future and Vonk adds the focus is now on securing EPC/M contracts: "What we are now aiming for is to increase our turnover in front-end loading, conceptual studies and EPCM projects. That is the rollout of KH Engineering, to be visible in the market as a company delivering consulting services and conceptual studies."

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Building a world class shipbuilding enterprise

Editorial: Elizabeth Hardy

COSCO Shipyard Group CO., Ltd has completed ten EPC projects this year alone – delivering its floating accommodation unit (FAU) to Logitel four months ahead of schedule, it is a world first featuring a unique Sevan cylindrical design. Speaking to Total World Energy, Mr. Liang Yanfeng, President of the COSCO Shipyard Group, explains the strategies for maintaining a healthy order book and why international companies continue to look to China for offshore services…

Founded in 2001, COSCO Shipyard Group CO., Ltd, a subsidiary of China Ocean Shipping Company (COSCO), is a large enterprise of groups specialising primarily in large vessel construction, ship repair and heavy steel structure services. With shipyards at Dalian, Nantong, Shanghai, Zhoushan, Qidong and Guangzhou, COSCO has a total dock capacity of 1.85 million tons with two capacities of 300,000 tons floating docks, four capacities of 150,000-200,000 tons docks and six capacities of 40,000-80,000 tons docks. Boasting a repairing and rebuilding capacity for more than 600 big ships every year, its total site area now covers an estimated 4.25 million sq. meters.

Last featuring COSCO Shipbuilding Group in our October issue, this month Total World Energy speaks to Mr. Liang Yanfeng, President of COSCO Shipyard Group who explains what 2015 has held for the Group so far: “The year 2015 has begun positively for us in several aspects, among which, production management and guaranteed deliveries.

"Over just the first two months of the year, we have delivered ten EPC projects, including one GustoMSC Ocean500 floating accommodation unit (FAU) to Cotemar; one cylindrical FAU to Logitel Offshore; three platform supply vessels (PSVs), based on the Ulstein PX 121 and the Rolls Royce UT 771 CDL designs, to Vroon, Tidewater and East Sunrise. Three panamax bulk carriers to Lomar and KC Maritime; one handy-size bulk carrier to Harbor Shipping and one handy-size product tanker to Coastal Refining Corp."

It seems that 2015 is off to a busy and exciting start as Nantong Shipyard delivered its FAU to Logitel Offshore four months ahead of schedule on 16th February - the Arendal Spirit is a world first floating accommodation unit with a unique Sevan cylindrical design.

"We are happy to introduce our floating accommodation units (FAU) and livestock carriers," explains Mr. Yanfeng. "These put us in the first league among domestic players, and the market demand for which is expected to rise in the coming years."

Nantong has now undertaken to build a further three FAUs, able to accommodate up to 490 people, with this cylindrical design, helping to improve comfort, stability and reliability. Capable of working in water depths of up to 3,000 meters, the FAUs are equipped with a DP3 dynamic positioning system which allow them to operate in particularly harsh conditions.

Currently under construction at COSCO's Zhoushan Shipyard is a second order from the Norwegian company, Knutsen, for a 152,000-dwt shuttle tanker, scheduled for delivery early 2017. The second vessel will measure 276 meters LOA, 46 meters in breadth and 24.3 meters in depth. It will be classed by DNV GL with a design draft of 16 meters and a scantling

draft of 17.55 meters.

"Currently, we have another seven units on hand, and our FAU order book is expected to further expand. The orders come from leading offshore contractors such as Prosafe, Cotemar, Axis Offshore and Logitel Offshore," explains Mr. Yanfeng.

"In the special purpose vessel segment, we have delivered four livestock carriers to the Dutch owner Vroon and have another three under construction in our yards. We have also undertaken to build a variety of other types of special purpose vessels, such as salvage lifting vessels, module carriers, and cargo and training ships."

Mr. Yanfeng explains that within the ship repair and conversion division, COSCO Shipyard Group is devoting itself to the "development and marketing of environment-friendly and energy-saving technologies." These include ballast water treatment system retrofit, containership bulbous bow conversion, propeller nozzle installation and photovoltaic power application.

> "The year 2015 has begun positively for us in several aspects, among which, production management and guaranteed deliveries"

"Meanwhile, we are prying deeper into the high-end ship repair and conversion market, trying to win more LPG, LNG carrier repairs as well as offshore marine equipment maintenance and upgrade," Mr. Yanfeng adds.

STRATEGIC IMPORTANCE

Although the drop in oil prices has led to a slight decline in new orders for COSCO Shipyard Group, its current order book remains

considerable with deliveries in place up until 2017 and to ensure repeat business, the company places great importance on safety, time efficiency and cost effectiveness with each project it undertakes.

"Our long-term goal is to strive for a sustainable growth," explains Mr. Yanfeng. "Our basic strategies are as follows: Firstly, we will continue to strengthen our presence in our three core business areas (ship repair/ conversion, shipbuilding, offshore building/conversion), and when one certain area is in the downturn, hopefully the other two will make up for it. It's easy to redistribute our resources among the three business areas at any time and reacquire the balance among them.

"Secondly, we have successfully developed several key competitive products and will continue to optimise our product structure. Our trademark products, such as livestock carriers, wind turbine installation vessels, FPSO conversions, cylindrical drilling rigs, and floating accommodation units, have been well received in both the domestic and global market.

Thirdly, we expect further cooperation with global oil majors and top oil companies in China, which will bring about remarkable improvement to our customer base. And finally, we are exploring opportunities to tap on both the upstream and downstream market."

Positioned as one of the largest ship repair and marine engineering groups in China, COSCO Shipyard Group currently occupies more than 20% share in the domestic ship repair market, with six integrated and fully equipped shipyards located along the east coast of China.

Also a leading player among Chinese shipyards, Mr. Yanfeng explains: "We are well-positioned to understand and meet customers' expectations. Our offshore marine projects in our order book cover a wide product range that includes FPSO, semi-submersible accommodation rig and vessel, Sevan 650 drilling unit, semi-sub tender assist drilling rig, jack-up rig, platform supply vessel, emergency response/rescue/ field support vessel, DP3 accommodation barge,

subsea supply vessels and others.

"As our offerings continue to move further up the value chain in the offshore marine segment, we will face further technical challenges in the production of higher value products. We will nevertheless continue to build on our expertise and capabilities to reach out to a broader customer base to lay an even firmer foundation for long-term sustainable growth in offshore and marine engineering operations."

FUELLING DEVELOPMENT AND INNOVATION

Maintaining such a prominent position within the industry is not always such an easy task. Development and innovation is essential, as is the team and their commitment to providing a safe, cost effective and time efficient service to each client.

"We have over 1,600 experienced local and oversea talents in our design teams, who are able to crystallise the ideas and requests of our clients into workable production plans," explains Mr. Yanfeng.

Using modern project management techniques, adapted from its Singaporean and South Korean counterparts, the project management teams at COSCO Shipyard Group are capable of managing complex high-end turnkey projects, including bulk carriers, oil/chemical tankers of various tonnages, multipurpose carriers, container ships, specialist vessels - livestock carriers, semi-submersible vessels, salvage lifting vessels and alternative energy related products - offshore wind turbine installation vessels, small and medium size LNG carriers, to name but a few.

The Technology Center, established in April 2002, ensures COSCO Shipyard Group is fully capable of developing detailed designs, product designs and production designs whilst providing technology advisory services. Its sub technology centers in both Nantong and Dalian were recognised as National Level Technology Centers in 2011 and 2013 respectively.

Within the domestic and international arena, COSCO Shipyard Group has seen many firsts – "Our products and technologies have been greeted with major honours and increasing popularity," explains Mr. Yanfeng. And there is certainly clear evidence for this - In 2014, its floating drilling and storage platform block launching and rotated shutting butt-joining techniques received the WIPO-SIPO award for Chinese Outstanding Patented Invention and in 2012, its cylindrical deepwater drilling rig design won the National Science and Technology Progress First award.

Also in 2012, COSCO's DP-3 deepwater drillship and offshore wind turbine installation vessels were certified as National Level Key New Products.

With such a successful history to date, COSCO Shipyard Group is well on its way to building a world class shipbuilding enterprise and becoming the preferred partner of choice for major shipping companies - so, what does the future hold?

"We seek a sustainable growth with constant innovation and a reliable track record," explains Mr. Yanfeng. "We will not only continue to provide satisfactory service to every customer, but also do our best to develop new technologies and products and create new possibilities and values for them.

"We firmly believe that, with our combined effort, the COSCO Shipyard Group will continue to thrive and become a preferred partner of world majors in both the shipping and marine resources exploitation industries in the foreseeable future," he concludes

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The Group

Sailing to success

Editorial: Ajuanne Payne

Bibby Ship Management, a division of the 200 year old Bibby Line Group, have grown exponentially over the past five years despite difficult market conditions and are taking exciting steps to further expand the business in local markets and beyond…

Bibby Ship Management is part of the 200 year old Bibby Line Group and is responsible for the ship management work for the group, offering marine services to all vessel sectors. Bibby Line Group itself was established in 1807 and is the UK's oldest family controlled company – with sixth generation owner, Sir Michael Bibby, at the helm today.

The group is a £1.59 billion turnover business, operating in more than 20 countries globally and employing 6,000 staff. Bibby Ship Management was established as a separate division within the group in 2008, where the offshore side of the business accounts for a significant portion of its focus, partly due to the flourishing North Sea oil industry and the unrivalled reputation that comes with being part of a major company with such a long and successful track record.

With offices in the UK, Isle of Man, Norway, Eastern Europe, Sweden, India, the Philippines and Singapore, Bibby Ship Management provides its services to the group's own fleet as well as its major third party customers.

The company offers comprehensive, tailor-made services, encompassing all areas of technical management, crew management and supply, training and travel and is currently managing and supplying crew to over 60 vessels - ranging from platform supply vessels and jack-up rigs to container vessels and accommodation barges.

RESPONDING TO THE MARKET

One of the key contributors to the group's success historically, and a culture that is present in Bibby Ship Management, is its deep-rooted focus on being flexible and making strategic decisions that ensure longevity and are responsive to the market.

Bibby Line Group has been pushing its Ship Management business for the last six to seven years with the aim of increasing on its already significant market share and also as a response to changes in the market. Due to the economic downturn, starting in the mid-2000s and still effecting international economies to the present day, the management side of the business has become one of the more financially sound areas of Bibby Line Group, with the company shifting focus slightly from its more traditional involvement in mainstream ship owning.

Sir Michael Bibby is quoted as saying: "China is the pivotal growth market in the world today." And this is one of the key strategic locations in which Bibby Ship Management is looking to grow and strengthen its business.

In November, 2014, Bibby Ship Management formed the new joint venture, Bibby-USM, with United Ship Management in the China and Taiwan regions. This new strategic partnership will focus on the offshore oil and gas, LPG and LNG sectors and aims to exploit business opportunities in the growing Chinese market and diversify on both company's operations there.

The new independent company will provide a range of comprehensive services such as consultancy, technical management, crew management, surveying, offshore training and marine travel. Arvind Mohan, Managing Director of Bibby Ship Management's Singapore operations, said that the company is "looking forward to working with United Ship Management to venture into the Chinese market through Bibby-USM Shipping Pte Ltd.

"We believe the alliance will open up new opportunities for us in this fast moving and important shipping region. It is an exciting time for our

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business and for the maritime industry as we expand further afield."

The benefit of teaming up with Bibby Ship Management, from the point of view of United Ship Management, is the wealth of industry knowledge and expertise that comes with teaming up with a company who has such an impressive reputation and long track record.

Kelvin Sun, Managing Director of United Ship Management, explains that: "With the new JV, we are confident and determined to be one of the major ship managers in these specialised and niche sectors."

A NEW APPOINTMENT

At the end of February this year, Bibby Ship Management appointed Andrew Rodden as its new Regional Director for the UK and the Isle of Man. With over 23 years of industry experience, Rodden will be responsible for crew and technical service delivery across the region, while also managing the support functions and other operational areas within each local business.

Previous to this appointment, Rodden was vice president of strategic resources for Technip and based in Paris - however his experience spans many different facets of the shipping and offshore industry. With a wealth of experience in management roles, on oil, gas and chemical tankers, diving support, pipelay and construction vessels, the new regional director brings with him the skills to further develop the continuously growing offshore side of the business.

Chief Operating Officer, Chris Stone explained that: "Andrew Rodden has a proven track record for successfully managing and leading teams. He knows the industry well so I am sure he will be a big asset to us here at Bibby Ship Management."

FURTHER OFFSHORE GROWTH

The decision to appoint a new regional director for the UK and Isle of Man with the experience that Rodden has was a timely move from Bibby Ship Management, as this year already it has seen a 20% increase in inquiries for its services to the offshore sector.

Currently, over 50% of the seafarers employed by Bibby Ship Management are positioned in the offshore sector and the company has a wealth of experience in working within this sector, which is a significant factor in its recent jump in interest into its services to the offshore market.

Another factor contributing to this increase is actually related to the recent slump in oil prices. Vessel owners and operators are trying to reduce costs, while still recruiting the best crews and ensuring the quality of their service.

This pressure to cut costs without effecting efficiency and quality has led to Bibby Ship Management seeing more interest from high-cost operators who require the high level of service that comes with working with the family company.

Rodden explains the hike in interest further, explaining that: “There is a calculable commercial advantage to be made and there is a partnership between owner and manager which can benefit and improve the overall quality of the service delivered to the oil company.

“Support vessels are operating in very high cost areas, such as Aberdeen and Oslo, and many are now looking to see if they can introduce cost savings without jeopardising the level of service. They are looking carefully at the OpEx of their vessels to see if they can save money from the crew employment perspective.”

KEY TO SUCCESS

Bibby Ship Management is one facet of a 200 year old company that has proven time and again that it consistently makes the decisions necessary to remain successful and grow, regardless of the market situation.

Andrew Rodden states that “Bibby Ship Management’s strength lies in its door to door, end-to-end service which will add value to the supply chain. Any ship owner can go to any company in the Philippines to get a Filipino crew, but the reality is being able to offer the security of doing all that in-house. We manage and control that process and we can add value at each step of the way.”

The company is ideally positioned to weather the storm in global markets and with recent developments in China and a dedicated approach to quality service and end-to-end solutions, it has made an impressive start to the year and promising things are on the horizon for the company.

Bibby Ship Management are building on its already significant market share and making the strategic moves that will ensure the company continues to flourish for the next century as it has in the previous one

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The mooring system specialists

Editorial: Elizabeth Hardy

Founded over two decades ago by Chairman Richard Martin who has established a career spanning 35 years in the mooring industry, London Marine Consultants was awarded the contract earlier this year to supply the external cantilever turret mooring system for the FPSO destined for one of Brazil's largest oilfields to date - Libra oilfield, located in the Santos Basin.

Boasting a reputation as one of the world's leading external turret designers, London Marine Consultants (LMC) specialise in the design and provision of mooring systems for FPSOs, FSOs and FSRUs.

A wholly owned subsidiary of Ezra Holdings Limited, LMC has an extensive range of services within the mooring sector, supplying both internal, external and disconnectable turrets and spread mooring systems.

With seven units currently operational and a further three units entering service within the next few years, LMC designed an internal turret for the Vietnamese field, Chim Sao in 2010. One of only three companies in the industry responsible for the design of external turrets, LMC now boasts a team of 50 engineers with an extensive range of services from mechanical and piping engineers and personnel within the naval and marine architecture sectors.

Amongst its many attributes, LMC also provides extensive consulting services, delivering Riser Conceptual Design Mid Water Arches (MWA) design, pile design, field development studies, fabrication supervision and procurement assistance for large projects.

TURRET MOORING SYSTEMS

A turret mooring system contains a fixed turret column which is supported by either an internal or external vessel structure, via a bearing arrangement. This design allows the FPSO to adopt a position which will provide the least resistance against harsh weather conditions.

An external turret mooring system is located outside the hull, either at the bow or at the stern of the vessel and contains a large diameter 3 race roller main bearing which in turn transfers the horizontal and vertical loads from the riser and mooring system, to the outrigger structure. This helps to transfer the weight of the turret and the turntable to above the main bearing of the outrigger.

The swivel stack is situated at the highest desk of these turntables and enables the transfer of fluid and electrical power to the turret access structure, located on the outrigger.

It was announced in January this year that Ezra's Floating Production, Storage and Offloading (FPSO) Turret Design outfit has been awarded to LMC by Sembcorp Marine's subsidiary, Jurong Shipyard of Singapore, to supply an external turret mooring system for a US$110 million deepwater project located 230km off the coast of Rio de Janeiro, Brazil.

Sitting as one of Brazil's largest oil fields to date, Petrobras' Libra oilfield in the Santos Basin, reaches depths of 2,500 meters and is estimated to contain recoverable reserves of between 8-12 billion barrels of oil; considered to be one of the largest deepwater oil accumulations on a global scale.

In addition to supplying the external turret mooring system for the Libra field's Extended Well Test (EWT) FPSO vessel, LMC has been awarded the design of the mooring lines, analyse the risers and provide ongoing engineering support for the integration of the turret and swivel stack which will sit on

top of the Navion Norvegia FPSO.

With a capacity to handle 50,000 barrels of oil and 4 billion cubic metres of gas per day, the FPSO is scheduled to start operations in the fourth quarter of 2016.

In a statement, Tim Wood, Managing Director of London Marine Consultants explained: “With a twenty year history as a proven supplier of advanced turret mooring systems, this project is a great opportunity for LMC to strengthen its position and move into the challenging deep water market of Brazil. We are very excited about this opportunity to work with Jurong Shipyard, One Subsea, OOGTK and Petrobras on this very important project.”

Engineering work and project management is currently underway at the company’s office in London with the planned turret fabrication works taking place at another of Ezra Holding’s subsidiaries, Triyards, in Vietnam. OneSubsea has been sub-contracted by LMC to manufacture the advanced swivel stack for the FPSO in Norway – the design for this will include six swivels, with two high pressure gas injection swivels.

“This contract highlights our diverse capabilities in the offshore oil and gas industry. We acquired LMC back in 2008 to enhance our engineering capabilities for the offshore oil and gas value chain, and this has enabled more business opportunities for us,” explained Lionel Lee, CEO and Managing Director of Ezra Holdings Ltd.

Installed in July 2013 after following and completing a very short schedule time, the Perisai Kamelia underwent its final testing and commissioning in Keppel Shipyard before it was transported and installed onto the Kamelia Field in the third week of July. Signed in November the previous year, under EOC’s contract with Hess Exploration and Production Malaysia B.V. (Hess), and in co-operation with local Bumiputera Malaysian partner, Larizz Petroleum Services Sdn Bhd, the contract covered a three year charter period in which the Perisai Kamelia was assigned to support the early production activities situated in the North Malay Basin, Malaysia.

Valued at an estimated project cost of $272.1 million, London Marine Consultants was contracted to design the external cantilever turret needed to withstand both the tropical cyclone conditions prominent in the area and to maintain the vessel’s geographical location. In December 2013, it was reported that the FPSO vessel had successfully completed its start-up and commissioning.

“Our efforts to maintain a healthy fleet utilization rate have clearly borne fruit, and the FPSO's ability to achieve start-up and commissioning and gas production in such a narrow time frame demonstrates once again the depth of our capabilities in this area and our unique ability to provide complex life of field solutions in a fully integrated manner where we can provide design, construction, installation and operation of oil and gas facilities using fully in-house or affiliate company resources. We will continue to study how we can use our expertise to expand our service offerings into an integrated delivery model followed by a life of field service to our clients. It will certainly help us boost our presence in Southeast Asia, which offers excellent offshore opportunities for our vessels and services," explained EOC's Chief Operating Officer, Jon Dunstan.

In the same year, LMC was contracted to develop the column turret design for Saipem and OLT for the FSRU Toscana vessel installed in August. The turret design will enable the LNG receiving terminal of the FSRU to be moored permanently 12 miles off the coast of Livorno, Italy, which it arrived at in June following its journey from Dubai Drydocks. The vessel has been fabricated with a regasification unit to convert the LNG, which will be transported alongside by carrier, to gas. Once converted, the gas will be sent through the turret and swivel system through risers before arriving at shore.

More recently, the fabrication of LMC's latest design column turret, is nearing completion and ready to be installed onto the FSO Gaza vessel located at the STX shipyard in Jinhae, South Korea. Fabrication of the turret is taking place at Keppel's shipyard in Singapore which, once completed and installed onto the vessel, will be transported to operate off the coast of Libya.

Coming up to its 25th year, London Marine Consultants has earned itself an irrefutable reputation within the global offshore industry. Contracted to offer its long-standing design and fabrication skills to numerous large and prominent FPSO projects, deployed around the world, the foreseeable future certainly looks set to be a positive one

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Electricity to power 300,000 German homes

Editorial: Harriet Pattison

With first electricity produced in February this year, at its full upgraded capacity of 312MW, the Borkum Riffgrund 1 offshore wind project will power over 300,000 German households on completion. Installing the new and innovative concept - the Suction Bucket Jacket – last year, it has the potential to help future wind turbine projects remain cost effective with efficient installation process times as wind power becomes a more viable option for renewable energy.

The 312MW Borkum Riffgrund 1 offshore wind farm, located 55km from the North-Western coast of Germany, is currently under construction in the North Sea.

At an estimated project cost of €1.25 billion (Feb 2011), the wind farm is maintained and operated by the Denmark based company, DONG Energy, who own 50%, Kirkbi (32%) and William Demant (18%). On completion, Borkum Riffgrund 1 will stand as one of the largest offshore wind farms in the world.

The first foundations for this project were laid in 2013 and commercial operation is expected to start later this year with the impressive estimation to power 300,000 German households' annual power consumption.

The wind farm will occupy an area of 36km2 and comprise of 78 Siemens 3.6MW three-bladed cantilevered wind turbines with 120m rotor diameter. The turbines will have 58.5m-long blades and a swept area of 11,300m2.

Initially a 77-turbine project, the 78th Siemens wind turbine was proposed to test the new Suction Bucket Jacket Foundation, fabricated by Bladt Industries, these new foundations have been implemented to hold the offshore wind turbines in place.

OFFSHORE SUBSTATION

Weighing approximately 3,500t, the offshore substation comprises of two main transformers, a topside supported by an eight-legged steel jacket supported by piles and will transport the electricity from the turbines to the convertor station of the transmission system operator.

Completed in August 2013, the substation was installed with a three-fold bubble curtain to help reduce noise transmission from the construction site and to comply with noise regulations.

Each monopile can weigh up to 750t with a diameter of six meters - a relatively simple design, they are made from a cylindrical steel tube which helps to support the tower by penetrating the seabed. This depth is entirely dependent on both the seabed and environmental conditions and can range from 0-30 meters.

A monopile is the most commonly used foundation within the offshore wind market due to its easy installation process which involves floating the monopile into position before driving it into the seabed using either steam or hydraulic powered hammers – jackups are most commonly used during this installation process.

MULTIPLE CONTRACTS

A project of this size will inevitably include multiple contracts and large installation works including the laying of submarine export cables, construction of the substation and the task of installing all 78 wind turbines have been implemented.

> “This foundation will save costs across design, fabrication, installation through to operation”

Sole supplier of all 78 wind turbines, Siemens is responsible for both the installation and commissioning of the turbines, providing maintenance services for a duration of five years.

ISC was awarded the contract for the detailed design of both the topside and jacket for the offshore substation with the installation of these foundations awarded to Scaldis Salvage Marine Contractors (Scaldis SMC), who further subcontracted Volker Staal en Funderingen for the jacket installation.

A2Sea is supplying its offshore installation vessel, SEA INSTALLER, to install the wind turbines in the North Sea with GeoSea responsible for the installation of the monopile foundations with scour protection for the turbines.

TenneT Offshore was

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contracted to provide grid connection from the offshore substation to the onshore grid.

The 34kV power generated by the wind turbines will be stepped up to 155kV by the offshore substation before transmitting it to the DolWin alpha, a high-voltage direct current converter station, via two high-voltage cables. The 155kV AC power will then be converted into 320kV DC electricity and transported to the onshore grid, Dörpen West Converter station, using two high voltage direct current cables. The DC power will then be converted into AC power before supplying to the German 400kV main grid.

In March this year, DBB Jack Up's new vessel, the purpose built J/U WIND SERVER, charted by Siemens AG, has been designed and constructed to provide offshore installation support and also function as an offshore accommodation vessel for Siemens' teams working on the Borkum Riffgrund 1 project.

Ole Jacob W. Nielsen, Head of Sales & Marketing at DBB explained: "We are very pleased to expand on our existing cooperation and partnership with Siemens to include installation support as well as O&M activities."

DONG ENERGY

One of the leading energy groups in Northern Europe, DONG Energy is based on procuring, producing, distributing and trading in energy across these locations. Headquartered in Denmark, it now boasts over 6,500 employees and was established in 2006 through the merger of six Danish energy companies: DONG, Elsam, Energi E2, Nesa, Københavns Energi and Frederiksberg Forsyning.

Now a prominent leader in the offshore wind farm industry, DONG Energy has 1.3 gigawatts of capacity currently in operation with a further 1.1 GW under construction. Borkum Riffgrund 1, on its completion later this year, will represent an important milestone for the energy company.

Trine Borum Bojsen, Managing Director of DONG Energy in Germany stated: "Borkum Riffgrund 1 is our first German wind farm and we're more than happy, that we've started to deliver CO2-free power to the German grid. We are very pleased that Borkum Riffgrund 1 proceeds as the first German offshore wind farm by Dong."

THE SUCTION BUCKET JACKET

In March last year, the offshore project received an upgrade due to a new and technical

innovation, in turn helping to reduce the cost of electricity. The Suction Bucket Jacket foundation, developed by DONG Energy in cooperation with the British Carbon Trust Offshore Wind Accelerator (OWA), was installed as an additional 78th position on the wind farm.

As offshore wind projects continue to grow in size and move into deeper and much harsher terrains, cost efficiency in developing projects of this size is imperative. The challenging conditions of the Borkum Riffgrund 1 project site proves the perfect test spot for the Suction Bucket Jacket as the seabed is both sandy and relatively unstable.

A lightweight and simple design, the foundation consists of three legs welded together in a jacket structure standing on top of three large suction buckets, helping to anchor the foundations to the seabed.

> “The increased capacity of our wind farm will be another important step to secure the supply from renewable energy sources”

If this concept does prove to be successful for offshore wind in the long-term, it will result in a quieter and quicker installation time and will prove a much more cost-effective option as the costly jacking-up process can be avoided.

As a result of the new foundations, an upgraded version of the 3.6MW turbine was implemented for all 78 turbines on the Borkum Riffgrund project, helping to boost power production to a total of 312MW from the original prediction of 277MW.

“The increased capacity of our wind farm will be another important step to secure the supply from renewable energy sources and therefore for the success of the German energy turnaround,” explained Bojsen.

“Apart from the improved production capacity of the turbine, the changes also include safety-related improvements. The experience with the 3.6

MW turbine in installation and operation has allowed important improvements to be defined and implemented to make work even safer."

In August last year, this new innovative foundation was successfully deployed, proving the potential it holds for making future offshore wind farm projects far more cost effective with easier and quicker installation process times.

Vice President for DONG Energy, Tove Feld, said: "It's a great day for us. We've now installed the very first Suction Bucket Jacket in the offshore wind industry. The reduction in cost of electricity and our ability to utilise some of the more challenging sites further from the coasts and in deeper water show some of the potential that this concept has. I'm very excited to see that the cooperation between the partners in this project, not least with Carbon Trust in the UK, is paying off with specific results."

Tom Delay, Chief Executive of the Carbon Trust stated: "We believe innovative foundation designs, such as the Suction Jacket technology play an important role in our efforts to cut the cost of energy from offshore wind. This foundation has been designed for serial fabrication and will save costs across design, fabrication, installation through to operation. Full scale demonstrations are the last critical step before a new innovative design can be considered for commercial projects. We are very enthusiastic about this design and the impact it will have on the industry and we have been very pleased to collaborate with DONG Energy and the other OWA partners to realise this demonstration."

First electricity to the grid was expected towards the end of last year but despite initial delays, it was reported that it began flowing in February this year. The project reached its half way point earlier last month too with 39 of the 78 wind turbines completed and with the remaining turbines expected to be finished within the next few months, Borkum Riffgrund 1 looks set to secure its position to be one of the largest offshore wind farms in the world, supplying electricity to over 300,000 homes in the not too distant future

Dong Borkum Riffgrund
Suction Bucket Jacket

SPT Offshore

- No noise under water
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- Easy decommissioned

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info@sptoffshore.com www.sptoffshore.com Contact: Mark Riemers - Managing Director

SPT Offshore is an independent offshore specialised contractor focusing on suction pile foundations and suction anchors for platforms, offshore wind farms and moorings for floaters. SPT is a subsidiary of the Royal Volker Wessels Stevin group, a Dutch group of contractors with a 2014 turnover of 4.5 billion euros and EBITDA of >5%.

SPT offers a wide portfolio of services to its clients: the detailed design, fabrication, transportation and installation of offshore structures. And concept studies used to identify cost savings of the suction pile founded self or barge installed platforms. In addition SPT offer rental of suction piles and owns and operates 20 remotely controlled suction pumps for water depths from 5 m to 3,000m. Using chartered or group's owned Offshore Construction Support Vessels, SPT executes complete mooring projects.

Developed specifically for offshore wind farms, SPT created a one piece suction installed wind turbine (SWIT) concept, which allows transport and installation of a wind turbine foundation and optionally complete with the pre-assembled wind turbine. SPT Offshore is involved in platform foundations, self-installing platforms, self-installing meaning that we don't require a crane barge every time for installing platforms. We see our business segment growing by the day and the benefits of suction piles are simple - they're noise free, allow re-installation or first installation for decommissioning quite rapidly.

Under contract with DONG Energy, SPT Offshore successfully installed the 3 suction buckets forming the foundation of the Suction Bucket Jacket (SBJ) for a 3.6 MW 120 Siemens wind turbine as part of the Borkum Riffgrund wind farm offshore Germany. The SBJ foundation is the world's first jacket founded on multiple suction buckets used for offshore wind turbines. The SBJ jacket including transition piece and the 3 buckets was lifted and lowered to the seabed in one piece with a total of only 850 ton. The jack-up installation vessel used was the Pacific Orca. The three (3) suction buckets measure 8m diameter by 8m height. The local water depth is 25m.

SPT Offshore and sister company Volker Steel and Foundations were awarded the contract for the fabrication of the test frame for the world's largest decommissioning vessel, Allseas' Pioneering Spirit. The test frame will be installed in the Dutch sector of the North Sea in a water depth of 30m.

Furthermore, SPT Offshore played an important role in the Wintershall L6-B project (see picture above) with its client Scaldis Marine Contractors. We carried out the tripod jacket design work together with another consultant company called Iv-Oil & Gas. Together we developed this concept which allowed a single piece installation without any additional offshore activities. We were then contracted separately by Scaldis to carry out the installation of the suction piles. The big innovation lies in our ability to build and assemble the complete jacket and topside as one piece in the harbor. Consequently the complete single piece tripod with minimal facilities topsides was transported to the field and installed in less than 16 hours. Including sailing back from the port of IJmuiden to the site and back to Rotterdam took about three days, so that was a world record for installation time.

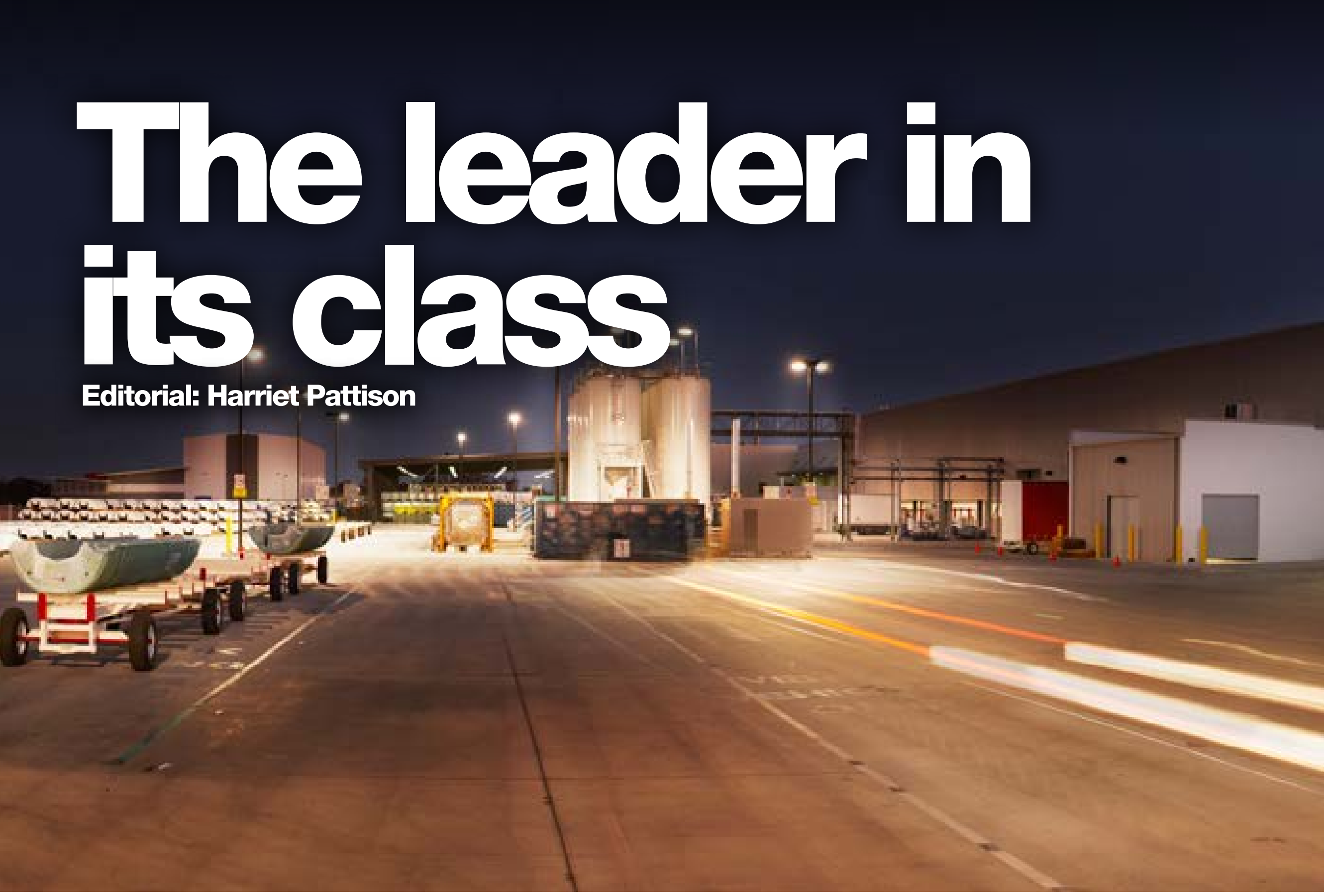
The secret to SPT Offshore swift installation success seems to lie in their meticulous preparation onshore before the offshore work begins. This not only saves time but has considerable cost saving implications which can then be passed on to the client. It's no wonder that SPT Offshore are increasingly becoming the go-to contractors for projects of all shapes and sizes and across the globe with a presence in West Africa, Southeast Asia, the North Sea (UK, Norway, Germany and Netherlands), Mexico and Malaysia to name but a few.

One of SPT's main focus areas is that we, apart from the suction anchors, also take care of the complete mooring line installation so one of our goals is to be a more prominent offshore contractor for the offshore moorings, whether it's for buoys or for FPSO's, or anything floating, such as floating wind farms. I see more and more opportunities for transformer stations for offshore wind farms in the future. We're also active in floating wind farms, not only in the mooring of the float itself but also the complete offshore assembly activities surrounding those.

With an impressive track record, a trail of record breaking achievements and a proven understanding of the intricacies of the industry SPT Offshore are on course for big things today, tomorrow and beyond.

The leader in its class

Editorial: Harriet Pattison



With Matrix Composites & Engineering's net profit after tax increasing by 467% over the corresponding period in the first half of FY2015 and having recently been awarded $32.2 million drilling riser buoyancy contracts, it's hard to believe this company was only founded 15 years ago. Total World Energy speaks to CEO Aaron Begley who explains why its automation technology is leading the field and plans for expansion…

With more than 15 years' experience manufacturing durable subsea buoyancy made from composite syntactic foam for the global oil and gas industry, Matrix Composites & Engineering is currently operating out of the worlds' largest, most technically advanced syntactic foam plant in Henderson, Western Australia.

"The original business was founded by my father in 1980," explains CEO Aaron Begley. "Begley International, as it was known then, was a heavy engineering business that focused on the domestic oil and gas sector."

In 1999 Matrix Composites & Engineering was established out of the need to diversify the Company's offerings. By the mid-2000's, Matrix had built its large hydrostatic testing facility which enabled the testing of riser buoyancy to API 16F standards – "Following that, we became more widely recognised as a quality supplier of riser buoyancy products," Begley explains.

"The subsea buoyancy side of the business has grown substantially as a result of an investment in a new state-of-the-art facility, just south of Perth. We spent over a hundred million dollars on a large automated facility

and this has been a game-changer in the industry.

"We have taken what is traditionally a very manual process that hasn't changed much for 30 years and automated it using mainly automotive production techniques. It has been very successful and has improved product quality and consistency, and has helped to reduce waste, production time and costs."

Matrix's core business now focuses on four key areas: providing capital drilling equipment (CDE), SURF and subsea solutions, well construction products and offshore services.

INNOVATIVE & AUTOMATED

The need for automation when executing large projects is evident, especially with repetitive functions which can lead to mistakes, and in some cases, injury. Begley explains the decision to automate its facilities was driven by the variability and inconsistencies often associated with manual labour.

"The biggest issue was simply the fact that we had operators performing repetitive tasks in a very manual way. It was difficult to automate but not impossible, so that's one of the things we've done," explains Begley.

Matrix now has the largest composites syntactic foam plant in the world and maintains its position as a leading player in the subsea buoyancy sector.

"We have also moved into the SURF space using similar materials and processes as our riser buoyancy products. We have developed a system we call IsoBlox™ – a buoyancy building block system for permanent applications where they need buoyancy to last up to 40 years, or for installation purposes," Begley explains.

NOTEWORTHY PROJECTS

In January, Matrix announced delivery of one of the largest installation buoyancy structures in the world to Heerema Marine Contractors (HMC). The modular installation structure, weighing 103MT in air and providing 105MT of uplift when in seawater, has been constructed from a modular design, the buoyancy system

CEO Aaron Begley

– IsoBlox™. It will be used in conjunction with HMC's installation vessel, Aegir, to ensure the safe installation of the Flowline End Termination (FLET) and In Line Tee (ILT) structures onto the seabed, 250m below sea level.

It is this advanced composites syntactic foam buoyancy system which has cemented Matrix's position as a technical leader in the manufacture of subsea buoyancy.

The modular installation structure – IsoBlox™ can be reassembled into an infinite number of different configurations to meet a client's changing requirements. It also allows for damaged elements to be removed rather than replacing the entire module and is a much more cost efficient design for the client, as only one set of modules is necessary.

> "There has not been the level of automation that we've applied anywhere else in the world – no-one has even come close"

Just last month, Matrix announced it had been awarded US$32.2 million worth of drilling riser buoyancy contracts. A number of these are for the supply of riser buoyancy for a large offshore drilling contractor who has not previously used Matrix buoyancy but with its longstanding reputation for product quality and a rigorous testing and qualification program, Matrix secured the deal.

The remaining contracts are for the after-market sale of a 12,000 ft. ultra-light riser buoyancy extension and a 10,000 ft. buoyancy string for a newbuild drillship which is currently under construction at a shipyard in Brazil.

"There have been many projects of note that we have been successful in securing," explains Begley. "Some of the contracts we've won are for major drilling contractors operating in Brazil and West Africa. Last year we also supplied nearly 1,000 tonnes of production buoyancy for two mid depth buoys used on the Ichthys LNG Project, one of the largest LNG projects on the planet, so that was quite a milestone."

INDUSTRY LEADERS

As the global technical leader in the manufacture of subsea buoyancy, Matrix has certainly made a name for itself both locally and further afield in a short space of time: "In terms of scale, you could take every other manufacturer's facilities in our sector and put them into ours," Begley explains. "On the flipside, if you then look at process, there has not been the level of automation that we've applied anywhere else in the world – no-one has even come close. It's a very different plant and has really brought this process into the 21st century as far as manufacturing this product.

"But we can't sit on our laurels, there's always competition and we have some competitors that are good at the various niches they operate within."

The Subsea Expo, held in February this year in Aberdeen, helps in bringing a vast variety of suppliers and customers together to both exhibit and network over a 3-day period.

"The Subsea Expo attracted many of our target market," Begley explains, "with lots of key decision makers there and people we could directly talk to about our products and services. There was a lot of cross industry interaction, not just about talking to our immediate customers but

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talking to engineering services companies, other suppliers, the whole cross-section of our supply chain was there and it was very valuable for us and we had a good experience."

GLOBAL FOOTPRINT

With its new and innovative facility located at its base in Henderson, Begley explains the company also has shop-fronts in both Houston and in the UK, strategically placed in close proximity to its clients.

"To cut a long story short, we believe we need a strong shop-front presence in places like Houston and the UK so our clients can get the same level of engineering and project management technical support and sales support as they would if they dealt directly with Australia. In some cases this can be more extensive as a result of local market knowledge," he adds.

"We employ people from those markets, from the UK and US and that way we can sell the products, service the products and support the products as if the plant was there."

Begley explains that next on the global footprint list is West Africa and an extended presence in the US - "In terms of expansion, we're looking to bolster the scope of our support in the US and in the UK, whilst looking at ways we can more effectively service the Brazilian and West African markets."

EXPANSION ON THE HORIZON

Although there continues to be extensive media coverage circling the current oil and gas industry, Begley explains markets including the Gulf of Mexico, Brazil, West Africa and Asia continue to run relatively unaffected – "There is definitely a scaling back of expenditure and a re-setting of markets but ultimately, lower prices generally leads to lower levels of exploration. I think what we're seeing as an industry is a push to drive better value out of the supply chain which will ultimately lead to lower costs for projects."

The future for Matrix looks set not only to last but to thrive, reporting its first-half profit of $3.9 million, up from $700,000 in its last corresponding period, and following a 20.7% rise in revenue to $78.5 million.

Begley attributes this continued success to a surge in the production and sales of its products, a direct result of the increase in capacity and capabilities at its Henderson facility.

"We'll certainly expand our global footprint," Begley says of the future, "including the continued expansion into the SURF space. We do have a level of diversification that we're looking at which may take us outside the oil and gas sector, however we won't go outside of our core competencies, which is our ability to transform syntactic foams and thermal plastics into advanced engineered products.

"In terms of immediate focus, it's in oil and gas applications in the four areas we continue to thrive: capital drilling equipment, SURF products, well construction products and offshore services," concludes Begley ⋮

> "In terms of expansion, we're looking to bolster the scope of our support in the US and in the UK, whilst looking at ways we can more effectively service the Brazilian and West African markets"

Lake Turkana Wind Project

Editorial: Harriet Pattison

The Lake Turkana Project, located in North Eastern Kenya, under construction and first power expected in 2017, stands as the largest single investment in Kenya's history. Awarded African Renewables Deal of the Year 2014, this wind power project is one of Kenya's Vision 2030 flagship projects, aiming to provide 300MW of reliable and cost-efficient wind power for the country...

Set to be the largest single wind farm in Sub-Saharan Africa, the Lake Turkana Wind Power Project (LTWP) – at an investment price of €600 million – is the largest single private investment throughout Kenya's history.

Covering 40,000 acres, the project will consist of 365 wind turbines, each with a capacity of 850MW. It aims to provide 300MW of reliable, efficient and low cost wind power energy to the National Grid of Kenya. This is the equivalent to 20% of the current installed electricity generating capacity.

Located in the Loyangalani District in Marsabit, in the West Country of Kenya, the project site was chosen specifically through extensive surveys that followed and focused on the environmental, social and sustainable effects a project of this size would have, with both the technological and commercial considerations also taken into account.

Of course, the strength, consistency and stability of the wind power is imperative for the Lake Turkana Project, as is, with any project of this scale, the security, availability of fresh water and road accessibility. From a data analysis survey undertaken since 2007, the site has shown to have some of the most efficient wind resources in Africa, with average wind speeds of 11 miles per second in the same direction, all year round.

With its fairly remote location, the project will also involve upgrading the existing stretch of road, a distance of 240km, from Laisamis to the project site and the access road that surrounds the construction site for ease of transport, operations and continued maintenance.

The Kenya Electricity Transmission Company Ltd (Ketraco), with part funding from the Spanish Government, is also constructing a double circuit 428km transmission line – with a capacity of 400KV – that will assist in delivering the electricity

from the LTWP site.

Providing low cost power, the wind power generated from LTWP will be the lowest power generation cost available in the country. With the majority of Kenya's electric power capacity retrieved from hydropower, with the remaining requirements filled by thermal and geothermal power supply, the wind power tariff is even lower than other wind projects in the country set at US$11 cents per kWh.

AFRICAN RENEWABLES DEAL OF THE YEAR 2014

In February this year, the Lake Turkana Wind Power project received the African Renewables Deal of the Year 2014 at the IJGlobal Awards 2014 Europe & Africa in London, which celebrates the best in class within both the energy and infrastructure sector over the last year. IJGlobal is an Infrastructure Journal and Project Finance Magazine which tracks global market activity to deliver and reveal up to date insights.

In addition to this award, the LTWP was also named the African Renewables Deal of the Year 2014 by Project Finance International.

IJGlobal Editor, Sarah Tame and Deputy Editor, Jon Whiteaker and broadcaster and comedian, Marcus Brigstocke hosted the ceremony, which aims to recognise achievement, excellence and innovation in energy and infrastructure finance.

Whilst announcing LTWP as the winner, Sarah Tame said: "This project is a very significant project for Kenya, with its huge associated transmission infrastructure likely to be used to connect future projects to the grid."

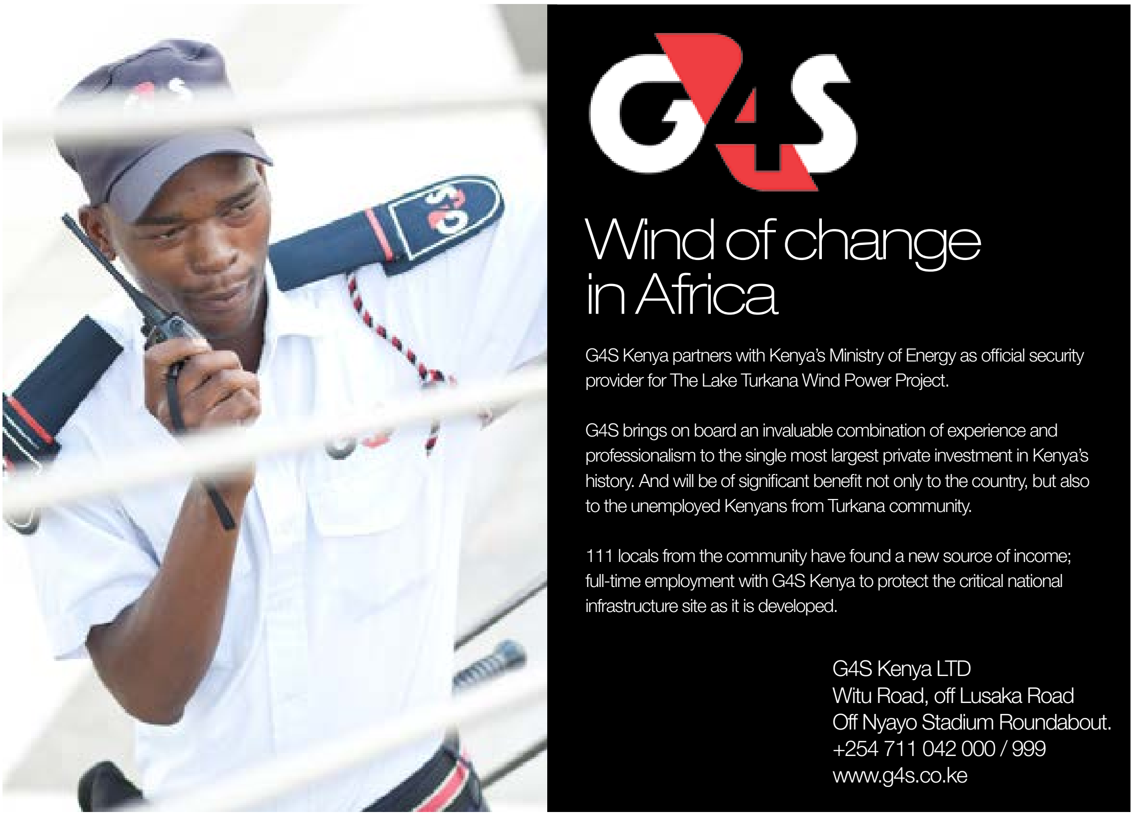
While newly appointed Chairman of the Board at LTWP, Mugo Kibati, said: "We are truly delighted to receive this award. It is not only a great honour for LTWP but for Kenya as a whole."

NEW APPOINTMENTS

In November last year - following the resignation of Mr. Carlo van Wageningen who led the project over its landmark development program - Mr. Mugo Kibati was appointed as Chairman of the Board of Directors of LTWP Ltd., with effect from 21st October 2014.

Former Chairman, Carlo van Wageningen, stated: "As I step down, after nine long challenging but exciting years, as the Chairman of LTWP, I am extremely pleased to handover the reigns of the Company to Mugo, a highly respected and qualified Kenyan that I have learnt to know and appreciate over the years. His foresight, experience and competent leadership qualities will guide the Board at this very exciting time when construction of the project starts. I look forward to supporting him as a Member of the Board. I wish him all the best in this endeavour."

While the new LTWP Chairman, Mugo Kibati added: "I am honoured and excited to join LTWP as Chairman. I look forward to working with this exceptional team to deliver the largest wind power project in Africa and



G4S

Wind of change in Africa

G4S Kenya partners with Kenya's Ministry of Energy as official security provider for The Lake Turkana Wind Power Project.

G4S brings on board an invaluable combination of experience and professionalism to the single most largest private investment in Kenya's history. And will be of significant benefit not only to the country, but also to the unemployed Kenyans from Turkana community.

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making our contribution to Kenya's, indeed Africa's progress at this critical time in its history. I wish to thank Carlo for his distinguished service and leadership in getting us to this point, and look forward to his and the other board members continued guidance."

A RENEWABLE SOLUTION

With the cities of Africa growing at a particularly fast rate - it is estimated that over the past 50 years, the urban population of the continent has more than doubled from 19% to 39% - with expectations that this will double again by the year 2030.

As a result, an increase in electricity generation, and in particular renewable energy generation, is critically needed. Kenya currently spends an estimated €120 million on importing fuel every year, so it is hoped that projects like LTWP, will not only help to save on foreign exchange imports, but also help to strengthen the Kenyan currency.

With the majority of Kenya's electrical power capacity based on hydropower – often an unreliable and costly method, especially during the dry seasons – wind power seems to be a reliable and strategic solution.

With a tariff which is 60% cheaper than the thermal plants currently in operation across the continent, the Lake Turkana Project, generating 300MW of wind power on completion, will also aid in reducing the cost of electricity, help to reduce the deficit the country is experiencing and stabilise the current power situation in Kenya.

With the construction phase lasting an estimated 32 months, with 2,500 jobs to be created and 200 full time positions throughout the project's operations, LTWP represents an important project for not only Africa but Kenya and its power generation capacity.

Aldwych, an experienced power company focused in Africa, is the largest single investor in the LTWP project, overseeing the construction phase and operations on behalf of LTWP on the plant site.

With financial close reached on the project in December last year, Helen Tarnoy, Managing Director of Aldwych, said: "We are tremendously proud of this landmark day in the development of the LTWP project and congratulate all parties on their commitment to achieving this goal. We at Aldwych are delighted to expand our already excellent relationship with the Government of Kenya and Kenya Power and look forward to becoming a trusted and valued part of the community in Northern Kenya."

Vestas will provide maintenance of the plant in a contract with LTWP whilst power from the plant will be purchased at a fixed price by Kenya Power over a 20-year period in accordance with the Power Purchase Agreement (PPA).

VISION 2030 PROGRAM

Following the financial close of Lake Turkana Wind Power Project (LTWP) on 11 December 2014, LTWP has received the first disbursement of funds pursuant to financing agreements signed in March 2014.

In a statement, Mugo Kibati said: “Reaching this important milestone today caps a year of major achievements by LTWP. This includes signing the financing agreements in March, issuing notice to proceed by KETRACO to the transmission line construction contractor in August, financial close of the LTWP equity partners in September, as well as notices to proceed to LTWP’s contractors in October.”

The support, interaction and uplifting of local communities is a high priority for LTWP. As such, LTWP adopted a Corporate Social Responsibility (CSR) Program which will be implemented by the Winds of Change Foundation - a wholly owned subsidiary of LTWP. This foundation aims to uplift local communities through programs such as the CHAT HIV awareness campaign, water, sanitation, electrification, sustainable development of agriculture as well as the education of boys and girls.

After eight years of development with the full support of the Government of Kenya, Kenya Power, the Energy Regulation Committee (ERC) and Kenya Electricity Transmission Company (KETRACO), utilization of the funds signifies the completion of the project’s financing stage, which will allow the project to move towards implementation and to commence producing electricity in 2017.

A flagship project within the Vision 2030 program, the LTWP is now on track to help deliver the Government’s commitment to increasing the electricity generation to 5,000MW.

In addition to his role as LTWP Chairman, Mugo Kibati, also Director General of Vision 2030 Delivery Secretariat, said in a statement: “Kenya is set to further develop as the hub of trade and logistics in Sub-Saharan Africa in line with the Vision 2030 outcomes for Kenya. The inclusion of a wind farm in Kenya increases the industrialization efforts for Kenya, which are necessary to helping Kenya realize a middle-income status by 2030 by ensuring that there is access to reliable and cost-effective electricity. In addition, the project will bring numerous social and economic benefits to Kenya, which we as the Vision 2030 Delivery Secretariat are totally committed to implementing.”

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DNV GL is committed to modernising and developing power in various key African countries such as South Africa, Kenya and Egypt and involved in the Lake Turkana Wind power project with advisory services, project management and 3rd party review.

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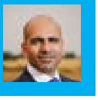
Key note opening welcome speech by DNV GL – Energy
CEO David Walker
Wednesday, May 13th 2015, 09:30 a.m.



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SAFER, SMARTER, GREENER
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The Russian oil and gas giant

Editorial: Ajuanne Payne

The largest privately owned oil and gas company in the world, accounting for 2.1% of global production of crude oil and with revenues of over US$139 billion, LUKOIL is one of the oil and gas majors that are the first to come to mind when picturing the global market. Over the past few years the company has been expanding internationally and cementing its hold in strategic regions worldwide and in this issue we take a look at the history of the company and its strategy moving forward…

The past decade in the oil and gas sector has been defined by the significant increase in exploration and production costs – with oil companies' expenditure on exploration, development and production estimated to have more than tripled since the turn of the century. The driving force behind this steady increase in costs is the depletion of conventional oil resources, coupled with a growth in the demand for hydrocarbons.

Companies have been forced to explore and develop more unconventional and remote resources, producing oil from deepwater shelves in inhospitable environments. This trend is expected to continue over the next decade - making investments into hi-tech production methods increasingly prevalent for the companies that are meeting the global demand for oil and gas.

Staying ahead of this fluctuating industry and responding to the market is a challenge for the global companies servicing the oil and gas industry and LUKOIL is a company that has proven itself to be up to this task many times over in the 20 years since it began operating.

LUKOIL first came in to existence on November 25th, 1991, and has since transformed itself in to the formidable presence it is today in the global oil and gas markets. The name LUKOIL – an abbreviation of the names of the cities that are home to the major oil-producing subsidiaries of the Company, Langepas, Uray and

Kogalym, represents the company's roots as an oil company.

Undertaking its first international project in 1994 in the Caspian Sea, LUKOIL has got to the strong position it is in today by consistently maintaining a methodical focus on expansion and strategic transactions – with refineries in six countries and retailing its products in over 30. International projects are now responsible for 9.4% of the company's proved hydrocarbon reserves and 10.2% of hydrocarbon production.

The company accounts for 2.1% of the global production of crude oil, with proved hydrocarbon reserves totalling 17.6 billion barrels and is responsible for 16.3% of Russian crude oil production and 16.7 % of Russian crude oil refining.

Since the purchase of 7.59% of the company's state-owned shares in 2004 by ConocoPhillips, LUKOIL has been the largest privately owned oil and gas company in the world by proved oil reserves and the third largest privately owned oil and gas company by oil production. It was in the same year that the oil and gas major began its transformation from an oil company to an oil and gas company.

A KEY REGION FOR THE COMPANY

One of the oldest oil-producing areas in the world and a historically important area for LUKOIL is the Caspian Sea Region. It is the world's largest endhoreic (inland) body of water, with its coast making up parts of the borders of Russia, Iran, Azerbaijan, Kazakhstan and Turkmenistan.

It is estimated that the sea has potential reserves of 48 billion barrels of oil and 292 trillion cubic feet of natural gas in proved and probable reserves in the Caspian basin and in the sea itself. Almost 75% of these reserves are within 100 miles of the coast.

Remaining largely undeveloped until the collapse of the Soviet Union in 1991, the Caspian Sea has become an area of increasing importance to the global oil and gas industry. It is the importance of these reserves that led LUKOIL to enter its first international project in 1994, with a 10% stake in the development of Azeri-Chirag-Gyuneshli – the largest oilfield in Azerbaijan's section of the Caspian Sea.

LUKOIL has since seen many fruitful years of work in the Caspian Sea and has been a key player in the development of the industry there. The company launched its own exploration in 1999 and within several years had discovered eight major oil and gas fields and 10 auspicious oil and gas structures in the region - the

first of which was the Yuri Korchagin oilfield in the Severny block of the Caspian Sea.

2003 saw LUKOIL sign an exploration and development contract with the Azeri State Oil Company for the Yalama block and in 2004 the company acquired 50% in a Production Sharing Agreement for the Tyub-Karagan region in Kazakhstan's segment of the Caspian Sea.

Arguably the most important discovery for LUKOIL and Russia itself was the Vladimir Filanovsky field, discovered by LUKOIL in 2006 the field has reserves totalling 153.1 million tonnes of oil and 32.2 billion cubic meters of gas.

2008 saw the commissioning of a major oil field by OOO Naryanmarneftegaz, a joint venture of LUKOIL and ConocoPhillips, in Yamalo-Nenets Autonomous District, with the oil from this field being transported via pipeline to the Varandey Oil Export Terminal. The project of 2009 for the company was the facility construction at Yuri Korchagin field in the Caspian Sea – an offshore trans-shipment complex, comprising of Single-Buoy Mooring System and FSU assembled 58km away from the platform. Drilling began at this project in December of that year, with oil production starting up in April 2010.

LUKOIL has a variety of interests and historically important projects in the Caspian Sea – a region that is not easy to develop from an infrastructure point of view. Infrastructure in the area is still not reflective of the potential for development and continued investment is needed to further develop the structure needed to make exploration and production in the Caspian Sea easier and more accessible. The company has the significant advantage of having not only the local connection to the area, but the funds needed to facilitate its development.

WEST QURNA-2

LUKOIL is implementing oil and gas exploration and production projects in 13 countries, taking part in projects in five countries outside of Russia, one of the most important of which is West Qurna-2 in Iraq. International projects currently account for 9.4% of the company's proved hydrocarbon reserves and 10.2% of marketable hydrocarbon production.

With the greatest increase in oil production over the next decade expected to come primarily from the Americas and the Middle East, the company is positioning itself to continue its market dominance over the next decade, recognising the importance of strategic locations globally within the oil and gas market.

Iraq is one of the most promising regions for oil production worldwide, but despite the country's huge proven reserves of around 143 billion barrels, production levels remain relatively low due to the lack of infrastructure in the country and the political situation. The Iraq government issued licences in 2009, announcing its ambitious goal of achieving daily production levels of 12 million barrels by 2020 and one of these was won by LUKOIL and Statoil – the development of West Qurna-2.

Estimated recoverable oil reserves in the field total approximately 13 billion barrels, to be produced from two sites - Mishrif and Yamama. One of the largest oilfields in the world, West Qurna-2 is located in Southern Iraq, 65km North West of Basra.

The field was first discovered by Soviet geologists in the 1970s and LUKOIL was first involved in the development of West Qurna over 17 years ago in the 1990s after signing an agreement to develop the field. Due to the political situation at the time the project was never implemented and it wasn't until it was tendered again by the Iraqi government in 2009 that LUKOIL won the contract for the second time and proceeded with its investment in the West Qurna-2 development.

With an area of over 300km^2, the field's current stakeholders are the National Iraqi South Oil Company (25%), with the other 75% being held by a consortium of contractors including LUKOIL (75%) and the National Iraqi North Oil Company (25%). LUKOIL bought out Statoil's stake in May, 2012.

Sergey Nikiforov, the new LUKOIL Overseas' president explains the importance of this project for the company and the Russian oil industry: "West Qurna-2 is a completely unprecedented project for the Russian oil industry in terms of scale and complexity. The team that we created has people from all of LUKOIL Overseas' projects and LUKOIL's Russian entities, as well as professionals from dozens of countries.

"Launching production at West Qurna-2 was a huge success for our Company. Having studied the data, our international consultants from IPA came to the conclusion that we completed the first phase of field development a year faster than the average.

"But the job ahead of us at West Qurna-2 is even larger in scale and more capital-intensive, especially since we've only invested one-tenth of the sum for the development of the entire field. The experience we gained there will play a pivotal role in our future major capital projects."

LUKOIL commenced production on March 29th, 2014, with current output exceeding 300,000 bpd. Major production facilities at the oilfield include a central processing facility (CPF), gas treatment plant, export pipeline, water pipeline, tank farm, power supply facilities, water pipeline and infield pipelines. The project will eventually have drilled several hundred new production, appraisal, exploration and injection wells.

THE GROWING IMPORTANCE OF NATURAL GAS

Initially considered a less important by-product of oil production, demand for natural gas has increased exponentially over the past several years. With lower emissions of CO^2 than oil and low cost, natural gas is coming out on top more often in comparison with other fossil fuels.

Coal and oil-powered plants globally are being upgraded to gas-fired plants to combat emissions and increase efficiency with this rate of growth estimated to continue at an annual rate of 2.2% for the next decade.

One of the challenges facing LUKOIL is accessing new markets to ensure their part as a key player in this growing market for natural gas. An important aspect of the company's work in this area is its presence in Uzbekistan.

The company is the country's largest investor, investing more than US$3 billion in the Uzbekistan economy to date. This significant investment centres on gas production.

Nikiforov explains that their

"assets in Uzbekistan are the most important component of LUKOIL's strategy for developing its gas business. We are increasing production at Khauzak-Shady and Southwest Gissar.

"But the most important thing is that LUKOIL Uzbekistan is moving into the key phase of developing the Kandym fields during which we will build a gas refinery with an annual capacity of around 8 billion cubic meters. This project is comparable to West Qurna-2 in terms of complexity and the level of investment. I'm sure LUKOIL Overseas will meet this challenge."

The product sharing agreement for the Kandym fields was signed in June 2004 and is looked after by subsidiary, LUKOIL Uzbekistan Operating Company. The agreement will last until 2046, with LUKOIL Overseas holding a 90% interest.

The first production complex in the Khauzak-Shady area in Bukhara Region was commissioned in 2007 and produced more than 3.7 billion cubic meters of gas in 2013 and 13.2 thousand tonnes of gas condensate.

The Kandym group, consisting of six gas condensate fields, will be developed by LUKOIL with the construction of a gas processing plant that will have an annual capacity of 8.1 billion cubic meters of gas. The construction of this plant is the company's largest investment project in Uzbekistan and will create over 2,000 jobs, employing more than 10,000 workers during the peak construction period.

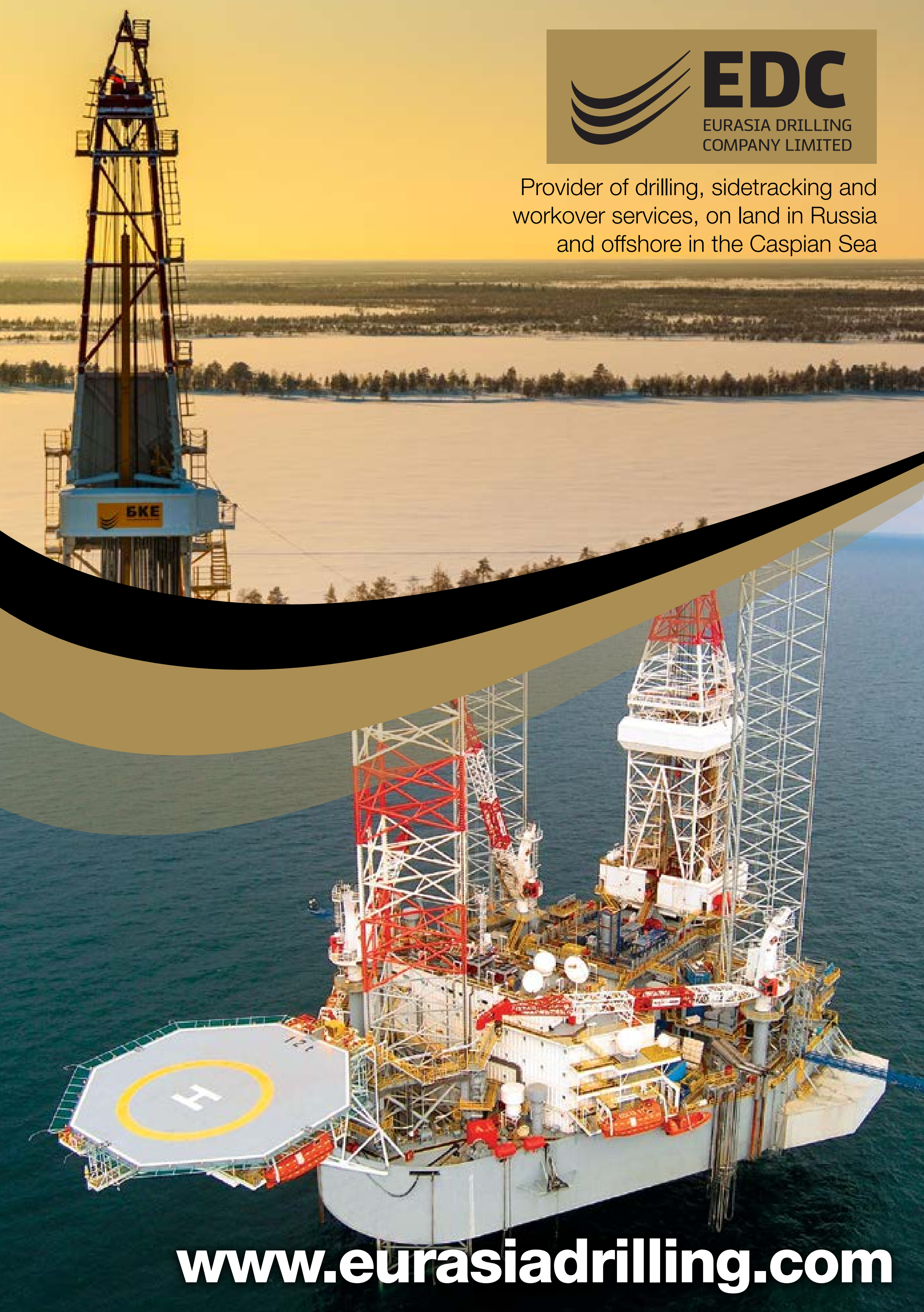
A COMPETITIVE EDGE

It is strategic investments such as those in Iraq and Uzbekistan that have ensured that LUKOIL has retained its competitive edge and title of number one privately owned oil and gas company globally.

Nikiforov explains that: "Dynamism is the essence of our Company, and our goal is to develop our business and establish new international production centres for LUKOIL. Right now we have two – the Middle East and Central Asia. We have to form a third one within five years. This is a very serious challenge, and we'll have to exert our best efforts to meet it."

In order to meet these challenges head on the company also invests heavily in research and development of new technologies – spending around US$160 million in 2014 alone.

With a strong track record for growth over the past 20 years, and the skills and capital necessary to be at the forefront of key developments in regions of importance to the oil and gas sector - LUKOIL has not only maintained its reputation as a global leader in the industry, but continued to build upon it year by year. This is a company who knows how to make strategic decisions – a company who knows how always to stay ahead of the game ⋮



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A safe and reliable anchor for the marine industry

Editorial: Rosie DeWinter

Providing a specialised and reliable service designing and delivering towing winches and mooring systems to some of the major shipbuilders and fleet operators across the globe in both the marine and offshore industry – DMT Marine Equipment has undoubtedly earned its position as one of the leading turn-key providers.

To ensure the smooth navigation and mooring of each and every ship that has ever sailed to and from a port, the mooring winch remains a vital component to the navigation system.

When a ship comes into port, its safe mooring is understandably important to prevent damage to both the vessel and shipping port - it is the mooring of such a large vessel however, compared to a small fishing boat for example, which can prove difficult and this is where the winch comes into play.

A mooring winch is a mechanical device used in securing a ship to the berth. Built with various barrels used for pulling ropes or cables, these barrels, also known as winch drums, are then used for pulling in or letting out the ropes and so help to fasten the ship to the berth ashore.

Today, mooring winches are far more elaborately designed with various gear assemblies - these can be electric, pneumatic or hydraulic driven.

A leader in the design and manufacture of naval equipment and marine winches, DMT Marine Equipment now boasts a reputable history that spans over a decade.

Providing a reliable and efficient service to global customers in both the domestic and foreign markets, DMT ensures its products are built to last.

Specialising in deck

equipment, offshore solutions, special projects and mega yachts equipment, the design and manufacture of marine winches is what has really set DMT Marine Equipment apart from the rising competition.

TURN-KEY PROVIDER

With a pulling force of up to 350 tons, a braking force of up to 650 tons and high speed render and recovery, anchor handling winches are heavy duty multiple drum winches mainly used in the offshore sector and in harsh weather conditions. These specialised winches are installed on Anchor Handling tug boats which help in performing platform assistance tasks and are delivered in waterfall configuration.

Delivered with a drum capacity, nominal pull and brake holding force, the Anchor Handling winches are designed with the client's requirements and specifications in mind and in line with the oil field operator requirements. While many of them are built with hydraulic activation, as mentioned above, the winches can also be powered by electric drives which are mastered by variable frequency controllers. They can also be equipped with chain pullers, warping heads and spooling devices.

The towing winch design has a pulling force of up to 350 tons, a braking force of up to 650 tons with high speed render and recovery. These winches are found on the aft decks of a variety of tugboats, from large ocean vessels to small river boats. Powered by hydraulic or electric drives, the winches can be designed to meet a range of configuration requirements and capacities.

Towing winches can also be fitted with force and length measurement systems and if hydraulic driven, they can be fitted with a hydraulic motor and control manifold placed inside the gearbox, helping to save space and so protecting them from the harsh environments inevitable with marine life.

Perhaps one of the most integral winch systems – a mooring winch – with a pulling force of up to 350 tons and a 650 ton braking force, helps to both guide, support the manoeuvring and the holding and positioning for loading

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and unloading either under normal conditions or with the assistance of constant tension systems. These mooring winches have been installed on vessels which are currently operating in the Northern European offshore industry.

Working on a turn-key basis, DMT both provides and delivers a complete mooring solution to clients. To ensure consistency and achieve optimum configuration mooring designs, DMT's engineers work closely with naval architects and naval design bureaus throughout the early stages and processes to include its CAD-design in deck arrangement plans and accurate stability calculations.

DMT's turn-key service ensures full responsibility of the mooring system, providing all the essential components, including the anchors, control stations located on the bridge and signalling electronics.

Providing input to DP-1, DP-2 or DP-3 installations, the Taut Wire Position Reference System is a measuring appliance that is mounted on either the port or starboard side of a DP operated vessel. A reliable and easy to manage unit, the system is constructed as a fully electric device without the need for pneumatics or hydraulics.

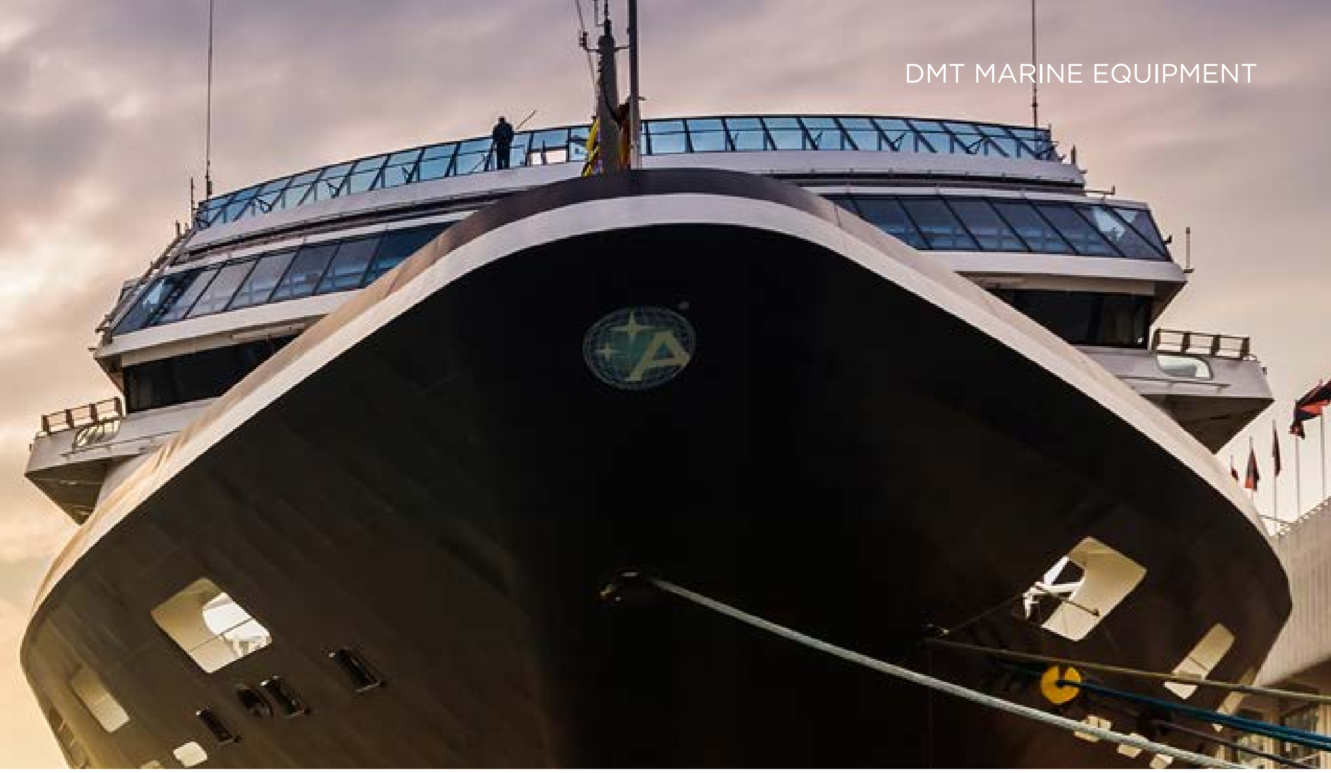
Helping to provide complete mooring and towing solutions for customers, DMT delivers coupling winches for fairleads, barges, capstans and bollards in addition to deck equipment including manholes, hatches and A-frames.

In addition to the items mentioned above, DMT also acts as intermediary for an array of nautical equipment, including cranes, rudders, doors, life-saving system and special projects, with their complexity dependent on the customer's specific requirements.

PLAYING ITS PART

Providing such a wide range and impressive selection of products and services to an increasingly high standard, it's no surprise DMT has been involved in so many high profile projects since its inception. Earlier this year, it supplied a TW-E100kN electrical forward winch for a new tug boat – Yenicay - a design by Sanmar AS and Robert Allan Ltd. Constructed at Sanmar's Tuzia shipyard, it achieved a 30mt bollard pull, measuring 18.7m x 9.2m, with a draft of 3.7m, it will join three other tugboats in Sanmar's fleet located at Petkim Port, Aliaga, and Izmir, Turkey.

DMT also received a contract for a TW-E 250KN double drum winch for the Svitzer Tyne tug. In February of this year, the UK fleet of Svitzer Towage received a boost following the arrival of three new tugs, with two built in Vietnam and one in Turkey. Key providers of harbour towage activities



throughout the UK and currently active in 15 ports, the new tug is equipped primarily for towing over the bow and so a DMT double drum was fitted with a maximum pull of 250KN (first layer) and braking force of 1,250KN (third layer) - the winch design also has storage capacity for 135m of 40mm UHMWPE rope.

DMT also played its part in Barney, the latest Damen Shoalbuster, following a contract signing between Herman Sr BV, the Dordrecht based tug and workboat company and Damen Shipyard in January 2014. With an impressive and comprehensive deck machinery outfit, DMT provided a triple-drum DMT winch aft, the anchor-handling drum holding 350m of 36mm wire and two towing drums each containing 650m of 36mm wire for the tug. All three components were rated with a 50t pull and 75t brake holding power.

Even after providing a reliable service and robust products designed to specific requirements, DMT ensures it provides a reputable after sales service to its clients too. This cover sets out to complete the turn-key service the company offers and highlights its mantra to keep the vessel's availability as cost effective as possible.

DMT's long-term support and after sales network helps to provide a complete inspection program, ensuring not only the functionality of its products throughout the complete life-time cycle of the vessel but also providing a long term support service. With the ability to source products on a global scale, DMT ensures the availability and quick delivery of spare parts when, and if, they are needed.

And of course, providing such reliable products and efficient service, DMT is able to provide training courses for both maintenance personnel and operators – to fully complete its well-deserved and reputable position as a leading turn-key service provider within the marine and offshore industry

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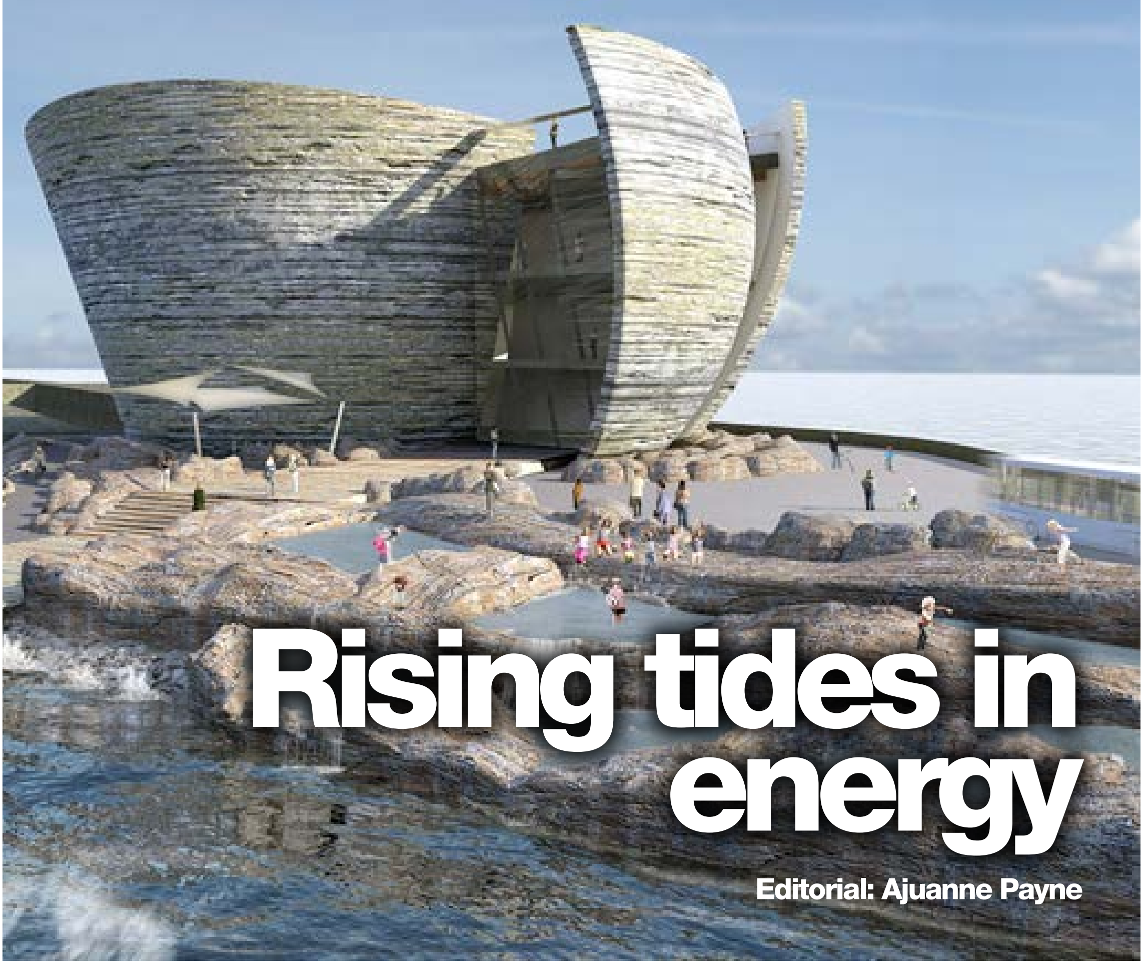


Rising tides in energy

Editorial: Ajuanne Payne

What type of energy production can you think of that is reliable, predictable, uncomplicated, emission free, visually unobtrusive and also contributes to community recreation? We couldn't think of any either – until now. The Tidal Lagoon, Swansea Bay project is set to commence later this year and is the first of six planned in the UK that could end up producing 8% of the UK's total energy supply and kick start a whole new renewables industry…

The Tidal Lagoon, Swansea Bay project is being developed by special purpose vehicle (SPV) company, Tidal Lagoon Power plc and will be the first of six planned giant lagoon structures that will generate electricity and could end up making up 8% of total UK power production. This method of generating power in tidal lagoons is a world first and has the potential to kick start a whole new renewables industry sector globally.

The UK has one of the highest tidal ranges in the world, beaten only by Canada, and subsequently has a huge, previously unexploited, source of renewable energy that could help change how we produce energy in the country.

The tidal range in Swansea Bay, first of the six proposed projects, is a huge seven to nine meters. The plans for this first pilot are for a 9.5km causeway that will create an 11.5km^2 lagoon, capable of generating power for an estimated 155,000 homes.

The £1 billion project will create jobs in the region, as well a facility that will become a multifunctional part of the community – the company's vision is for the lagoon to be used as a sporting and recreation facility, marine culture farm and educational centre.

In order to construct the lagoon, sand and gravel will be hovered up from the local seabed and pumped in to high strength textile geo-tubes. The tubes will then be layered up, with the area between filled with sand. Different grades of rock will be applied to act as a barrier against the sea and the causeway will run across the top of the entire length of the wall, will sit 2.8 meters above high tide level and be available to the public.

Installed in to the causeway will be the concrete turbine housing – 550 meters long and housing 26 turbines. Each one will be six meters in diameter, 18 meters long, able to generate up to 16MW per hour and expected to be active for an average 14 hours per day.

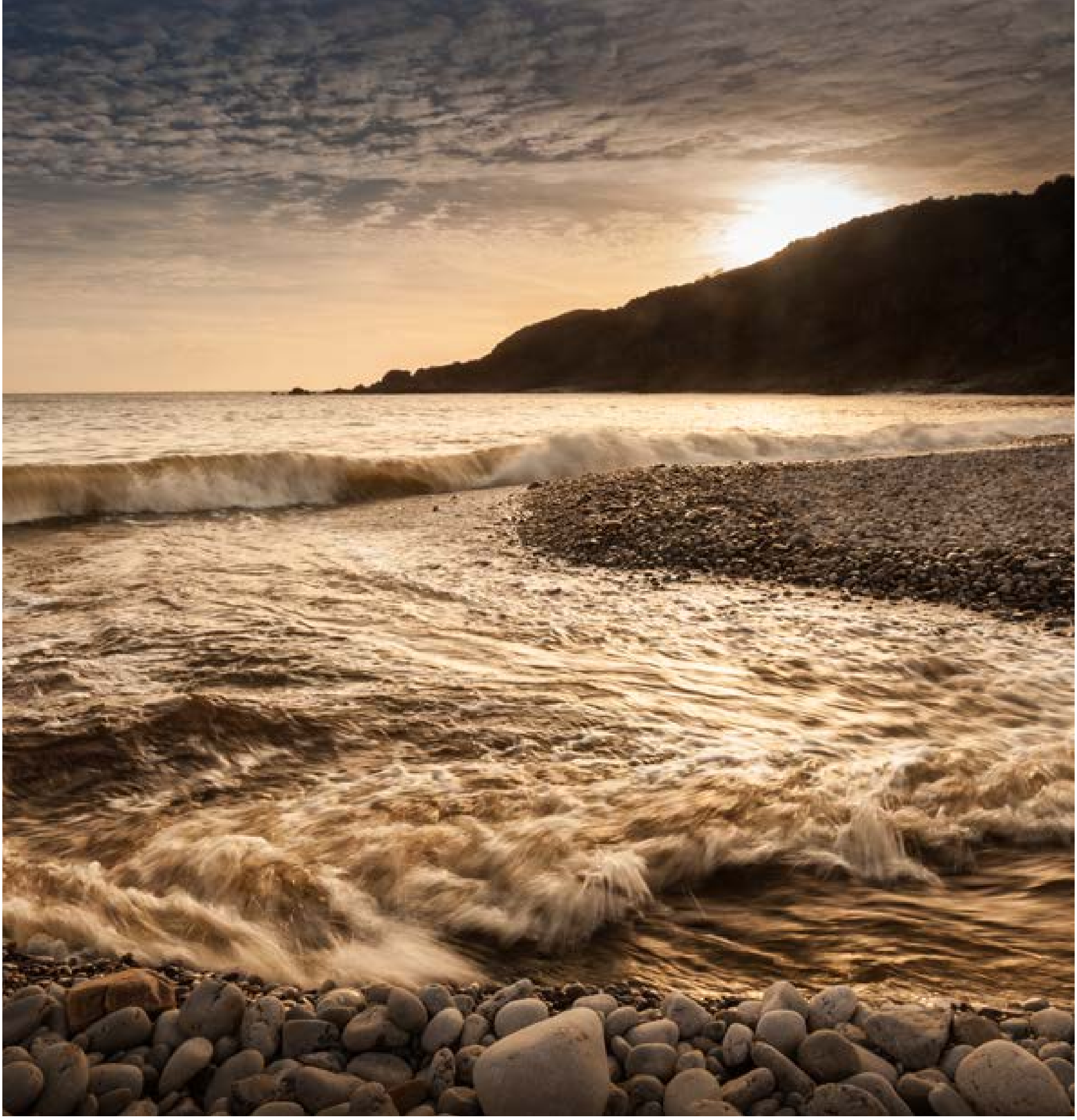
The lagoon will operate similarly to a lock gate, with the water level on either side altering dependant on the operation of the wicket gates in the turbines. When the tide rises, the wicket gates are closed and the water level in the sea will rise above the level inside the lagoon. When the tide reaches maximum height outside the lagoon, the gates are opened and water flows in to fill the lagoon, turning the 700 tonne turbines to generate power. The procedure is then reversed as the tide falls and the water flows back in the opposite direction.

One of the pivotal themes for this project and a part of the company's ethos is the importance of using UK suppliers and expertise, thereby boosting local infrastructure. The £300 million contract for the supply of 16 bidirectional turbines to the lagoon was recently awarded to General Electric and Andritz Hydro.

Part of the reason for this award was that outlined in the company's joint bid was a clear commitment to keeping British industrial components and expertise at the heart of the turbine production.

The turbines themselves will be based on Andritz Hydro global technology, with components being sourced in the UK. The companies have committed to the launching of a dockside Turbine Assembly Plant in Wales that will initially employ 100 skilled workers, with operations expected to be scaled up by six times by 2018.

The cost of the project will be funded by end consumers under an existing government framework to promote local, low-carbon energy. Negotiations are still ongoing, however it is estimated that electricity at the Swansea facility will cost £168 per MWh, reduced to around £90 for the next, more efficient, lagoon planned in Cardiff.



The £90 figure can be compared positively with the £92.50 price for power from the planned Hinkley nuclear power facility – evidently also having a much lower risk and with a design that will produce electricity for 120 years.

Mark Shorrock, CEO of Tidal Lagoon, Swansea Bay plc, was quoted on the BBC news, saying that, "we have a wonderful opportunity to create energy from the dance between the moon and the earth.

"It is admittedly rather expensive to begin with, but as time goes on and the capital costs are paid off it becomes incredibly cheap."

The project has received an incredible amount of support and is backed by energy secretary, Ed Davey. Included in the National Infrastructure Plan 2014, published by HM Treasury, the project could bring up to £5 billion in investments in to Wales alone and the development of a global tidal lagoon industry could create an export industry worth £70 billion to the economy in the UK.

In this day and age we are used to the industrial and functional appearance of the power stations that are scattered across our countryside. In the case of the proposed tidal lagoon projects, there is a real opportunity to create facilities that exceed all practical expectations, while also contributing to the community in a multitude of ways not directly relating to power and remaining aesthetically pleasing at the same time.

Perhaps most importantly of all we would have a renewable, emission free, facility that can be constructed using existing technology and where the output would be completely predictable and reliable – more so than existing wind and solar technologies. A surprisingly simple solution that has the potential to birth a whole new renewables industry – in this case proving that the simple answer really is usually correct ⋮

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